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UNIVERSITY OF WASHINGTON, OFFICE OF PUBLIC ARCHAEOLOGY
for U.S. ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT

ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-OK-2 AND 45-OK-2A CHIEF JOSEPH DAM PROJECT, WASHINGTON

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with L. Hause, S. Livingston,
and N.A. Stenholm

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ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-OK-2 and 45-OK-2A, CHIEF JOSEPH DAM PROJECT, WASHINGTON

by

Sarah K. Campbell

with

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Final report submitted to the U.S. Army Corps of Engineers, Seattle District, in partial fulfillment of the conditions and specifications of Contract No. DACW67-78-C-0106.

The technical findings and conclusions in this report do not necessarily reflect the views or concurrence of the sponsoring agency.

Office of Public Archaeology
Institute for Environmental Studies
University of Washington

1984

ABSTRACT

Sites 45-OK-2 and 45-OK-2A are on the floodplain of the Columbia River (between River Mile 580-581) near the mouth of the Nespelem River in an upper Sonoran life zone. Excavations were conducted at 45-OK-2A in 1979 and 45-OK-2 in 1979 and 1980 by the University of Washington under contract to the U.S. Army Corps of Engineers, Seattle District as part of a mitigation program for a 10-foot pool raise at the Chief Joseph Dam Project. Total volumes of 90.6 cubic meters at 45-OK-2A and 372.9 cubic meters at 45-OK-2 were removed in 1 x 1 x 0.1-meter units of record in 1 x 2-m or 2 x 2-m sample units. Random sample units, 64 at 45-OK-2 and 29 at 45-OK-2A, were selected using a stratified random sampling design with a higher sampling intensity in areas with visible surface depressions. An additional 81 nonrandom units were excavated at 45-OK-2. Four occupations are evident in the alluvial sediments of the terrace in the vicinity of 45-OK-2. The oldest is an early to middle Hudnut Phase component dated between 4000 and 3000 B.P. and characterized by sloping lenses of shell and other cultural materials. Although seasonal indicators suggest that the site was used year-round, no conclusive evidence of structures was recovered. Between 3000 and 1500 B.P., occupation was less intense, but shell lenses were still being deposited and the first pithouse was built. Numerous pithouses and year-round occupation characterize the third occupation, a Coyote Creek Phase component dating between 1300 and 500 B.P. Intense, year-round occupation between 500 B.P. to 50 B.P. resulted in several types of semisubterranean and surface structures. The material culture of this late Coyote Creek-historic component differs little from the previous occupation except for a greater diversity and the introduction of a few trade items. At 45-OK-2A, a few scattered artifacts associated with an alluvial fan surface are the oldest materials. Artifacts are also rare in the two overlying zones, associated with overbank deposits. A single Cascade point in the uppermost of these is the basis for assigning these three zones to the Kartar Phase. The subsequent occupation, assigned to the Hudnut Phase on the basis of two projectile points, is characterized by relatively dense cultural materials, and includes several housepits. The latest occupation at 45-OK-2A, assigned to the Coyote Creek Phase on the basis of projectile point styles, is represented by a dense pavement of fire-modified rocks with associated artifacts. No structures were recognized. The absence of side-notched points and trade goods suggests that occupation at 45-OK-2A ceased while 45-OK-2 was still being occupied.

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PREFACE

The Chief Joseph Dam Cultural Resources Project (CJDCRP) has been sponsored by the Seattle District, U.S. Army Corps of Engineers (the Corps) in order to salvage and preserve the cultural resources imperiled by a 10 foot pool raise resulting from modifications to Chief Joseph Dam.

From Fall 1977 to Summer 1978, under contract to the Corps, the University of Washington, Office of Public Archaeology (OPA) undertook detailed reconnaissance and testing along the banks of Rufus Woods Lake in the Chief Joseph Dam project area (Contract No. DACW67-77-C-0099). The project area extends from Chief Joseph Dam at Columbia River Mile (RM) 545 upstream to RM 590, about seven miles below Grand Coulee Dam, and includes 2,015 hectares (4,979 acres) of land within the guide-taking lines for the expected pool raise. Twenty-nine cultural resource sites were identified during reconnaissance, bringing the total number of recorded prehistoric sites in the area to 279. Test excavations at 79 of these provided information about prehistoric cultural variability in this region upon which to base further resource management recommendations (Jermann et al. 1978; Leeds et al. 1981).

Only a short time was available for testing and mitigation before the planned pool raise. Therefore, in mid-December 1977, the Corps asked OPA to review the 27 sites tested to date and identify those worthy of immediate investigation. A priority list of six sites was compiled. The Corps, in consultation with the Washington State Historic Preservation Officer and the Advisory Council on Historic Preservation, established an interim Memorandum of Agreement under which full-scale excavations at those six sites could proceed. In August 1978, data recovery (Contract No. DACW67-78-C-0106) began at five of the six sites.

Concurrently, data from the 1977 and 1978 testing, as well as those from previous testing efforts (Osborne et al. 1952; Lyman 1976), were synthesized into a management plan recommending ways to minimize loss of significant resources. This document calls for excavations at 34 prehistoric habitation sites, including the six already selected (Jermann et al. 1978). The final Memorandum of Agreement includes 20 of these. Data recovery began in May 1979 and continued until late August 1980.

Full-scale excavation could be undertaken at only a limited number of sites. The testing program data allowed identification of sites in good condition that were directly threatened with inundation or severe erosion by the projected pool raise. To aid in selecting a representative sample of prehistoric habitation sites for excavation, site "components" defined during testing were characterized according to (1) probable age, (2) probable type of occupation, (3) general site topography, and (4) geographic location along the river (Jermann et al. 1978:Table 18). Sites were selected to attain as wide a diversity as possible while keeping the total number of sites as low as possible.

The Project's investigations are documented in four report series. Reports describing archaeological reconnaissance and testing include (1) a management plan for cultural resources in the project area (Jermann et al. 1978), (2) a report of testing at 79 prehistoric habitation sites (Leeds et al. 1981), and (3) an inventory of data derived from testing. Series I of the mitigation reports includes (1) the project's research design (Campbell 1984d) and (2) a preliminary report (Jaehnig 1983b). Series II consists of 14 descriptive reports on prehistoric habitation sites excavated as part of the project (Campbell 1984b; Jaehnig 1983a, 1984a,b; Lohse 1984a-f; Miss 1984a-d), reports on prehistoric nonhabitation sites (Campbell 1984a) and burial relocation projects (Campbell 1984c), and a report on the survey and excavation of historic sites (Thomas et al. 1984). A summary of results is presented in Jaehnig and Campbell (1984).

This report is one of the Series II mitigation reports. Mitigation reports document the assumptions and contingencies under which data were collected, describe data collection and analysis, and organize and summarize data in a form useful to the widest possible archaeological audience.

ACKNOWLEDGEMENTS

This report is the result of the collaboration of many individuals and agencies. During the excavation and early reporting stages, co-Principal Investigators were Drs. Robert C. Dunnell and Donald K. Grayson, both of the Department of Anthropology, University of Washington, and Dr. Jerry V. Jermann, Director of the Office of Public Archaeology, University of Washington. Dr. Manfred E.W. Jaehnig served as Project Supervisor during this stage of the work. Since Fall of 1981 Dr. Jaehnig has served as co-Principal Investigator with Dr. Dunnell.

Several archaeologists on the staff of the Corps of Engineers have made major contributions to the project. They are Dr. Steven F. Dice, Contracting Offier's Representative, and Corps archaeologists Lawr V. Salo and David A. Munsell. Mr. Munsell and Mr. Salo have worked tirelessly to assure the success of the project, from its initial organization through site selection, sampling, analysis, and report writing. Mr. Munsell provided much needed guidance in the initial stages of the project and developed the strong ties with the Colville Confederated Tribes essential for the undertaking. Mr. Salo gave unstintingly of his time in order to guide the project through data collection and analysis; in his review of each report, he exercises that rarest of skills, an ability to criticize constructively. Particular thanks is due for the topographic maps of OK-2 and OK-2A, produced by the COE from aerial photo imagery which they obtained.

We have been fortunate in having the generous support and cooperation of the Colville Confederated Tribes throughout the whole project, especially the Business Council--the governing body of the Tribes--and the History and Archaeology Office. We owe special thanks to Andy Joseph, representative from the Nespelem District on the Business Council, and Adeline Fredin, Tribal Historian and Director of the History and Archaeology Office. Mr. Joseph and the Business Council, and Mrs. Fredin, who acted as liaison between the Tribe and the project, did much to convince appropriate Federal and State agencies of the necessity of the investigation. They helped to secure the land and services needed for the project's field facilities as well as to establish a program which trained local people, including many tribal members, to be field excavators and laboratory technicians. Beyond all this, they extended us that courtesy and kindness which has made our stay in the project area a pleasant one. In return, conscious of how much gratitude must be packed into a few brief words, we would like to extend our most sincere thanks to all the members of the Colville Confederated Tribes who have supported our efforts, and to Mrs. Fredin and Mr. Joseph in particular.

Site 45-OK-2 is located on land owned by the Colville Confederated Tribes, and 45-OK-2A is located on land owned by Charles D. Shull of Brewster and leased to R.C. (Bud) Spence. We thank the Colville Confederated Tribes and both Mr. Shull and Mr. Spence for granting us permission to excavate the sites.

As authors of this report, we take responsibility for the contents. What we have written, however, is only the final stage of a collaborative process which perhaps has its nearest, and most appropriate, analogue in the integrated community of the people whose physical traces we have studied here. Some, by dint of hard labor and archaeological training, salvaged those traces from the earth; others processed and analyzed those traces; some manipulated the data and some wrote, or edited and produced this report. Each is a member of the community essential to the life of the work we have done.

Jerry V. Jermann, co-principal investigator during the field excavation and artifact analysis phase of the project, developed site excavation sampling designs that were used to select data from each site. The designs provided a uniform context for studying prehistoric subsistence-settlement patterns in the project area. Excavations at 45-OK-2 were directed by Dr. Jaehnig and those at 45-OK-2A by Jim Benson and Guy Moura.

Larry Hause accomplished the initial data summary for the stratigraphic analysis and Susan Freiberg performed the chemical and mechanical sort analyses. Thanks also to Neal Crozier for his preliminary stratigraphic analysis of OK-2A. Denise Varner compiled the data for feature analysis and zone definitions. Under the direction of Karen Whittlesey and Kathy Lewin, Judith Groves, Cindy Amdur, and Julie Hammett did the technological artifact analysis and Anita Hornback the functional analysis. Janice Jaehnig did keypunching and John Chapman and Duncan Mitchell manipulated the computerized data. Chuck Hibbs helpfully examined the historic artifacts and provided identifications.

The writing of the report itself is cooperative effort. Stephanie Livingston analyzed the faunal assemblage and wrote Chapter 4, Faunal Analysis. Dr. Nancy A. Stenholm, project archaeobotanist, wrote Chapter 5, Botanical Analysis. Sarah K. Campbell with Larry Hause, wrote Chapter 2, Natural and Cultural Stratigraphy. As senior author, she wrote the remaining chapters and co-ordinated and integrated the contributions of the other authors.

Marc Hudson edited the text, Dawn Brislawn typed the text and co-ordinated production. Fred Clark prepared preliminary versions of many of the figures; Melodie Tune and Bob Radek drafted the final versions. Bob Radek also boxed the tables. The artifact drawings in Chapter 3 were done by James Bennett. Larry Bullis photographed the artifacts and printed the photographs. Bob Thomas prepared the artifact and site overview photographs for the report. Production of the final camera ready report was accomplished by Charlotte Beck, Pippa Colley, Patricia Ruppe, Julie Tomita and Emily Campbell under the direction of Sarah Campbell.

The cover photograph, a view of the Douglas County bank from near 45-OK-2A, was taken with infra-red film by Larry Bullis and also printed by him. The cover layout was done by Bob Radek.

1. INTRODUCTION

Sites 45-OK-2 and 45-OK-2A are large, multicomponent sites with multiple house structures on the Columbia River in north central Washington (Figure 1-1). Previously tested by the University of Washington in 1950 (Osborne 1950) and Washington State University in 1975 (Lyman 1976), these sites were excavated in 1979 and 1980 as part of the Chief Joseph Dam Cultural Resources Project (CJDCRP) sponsored by the U.S. Army Corps of Engineers (the Corps) to mitigate the effects of a ten-foot (3 m) pool raise expected to result from modifications to Chief Joseph Dam. This report explains recovery methods, summarizes the chronology and structure of the deposits, and describes the kinds and numbers of materials recovered. The data base has considerable research potential, which can be addressed only cursorily within the scope of this project. In this report, we hope to stimulate interest in the data base, and to provide a guide to the data for future researchers.

Selected for excavation because it is the largest village site in the project area, and one of the few with a contact period occupation, 45-OK-2 as expected has yielded a data base of great research potential as expected. Excavations recovered evidence of occupation spanning the period from 4000 B.P. to historic times. Large assemblages were recovered from four components, although the two latest occupations, from 1500 B.P. to historic times, were most extensively investigated. Differences in content between the components promise great potential for testing hypotheses about cultural change and stability over the last 4000 years. The site also provides the best data base in the project area for the examination of the effects of contact on Native American cultures, and will contribute to the understanding of the late prehistoric/contact period in the Northwestern Plateau and Okanogan Highlands.

Site 45-OK-2A was selected for excavation because of its close geographic association with 45-OK-2. These two adjacent sites initially were considered a single site (see discussion of Osborne's work in this chapter), and may once have been parts of the same use area. Occupied at the same time as 45-OK-2, with the exception of the historic period, 45-OK-2A also contains multiple structures and cultural remains approaching the density of those at 45-OK-2 in some areas. However, the excavation was limited in scope and the assemblages recovered were much smaller than those at 45-OK-2.

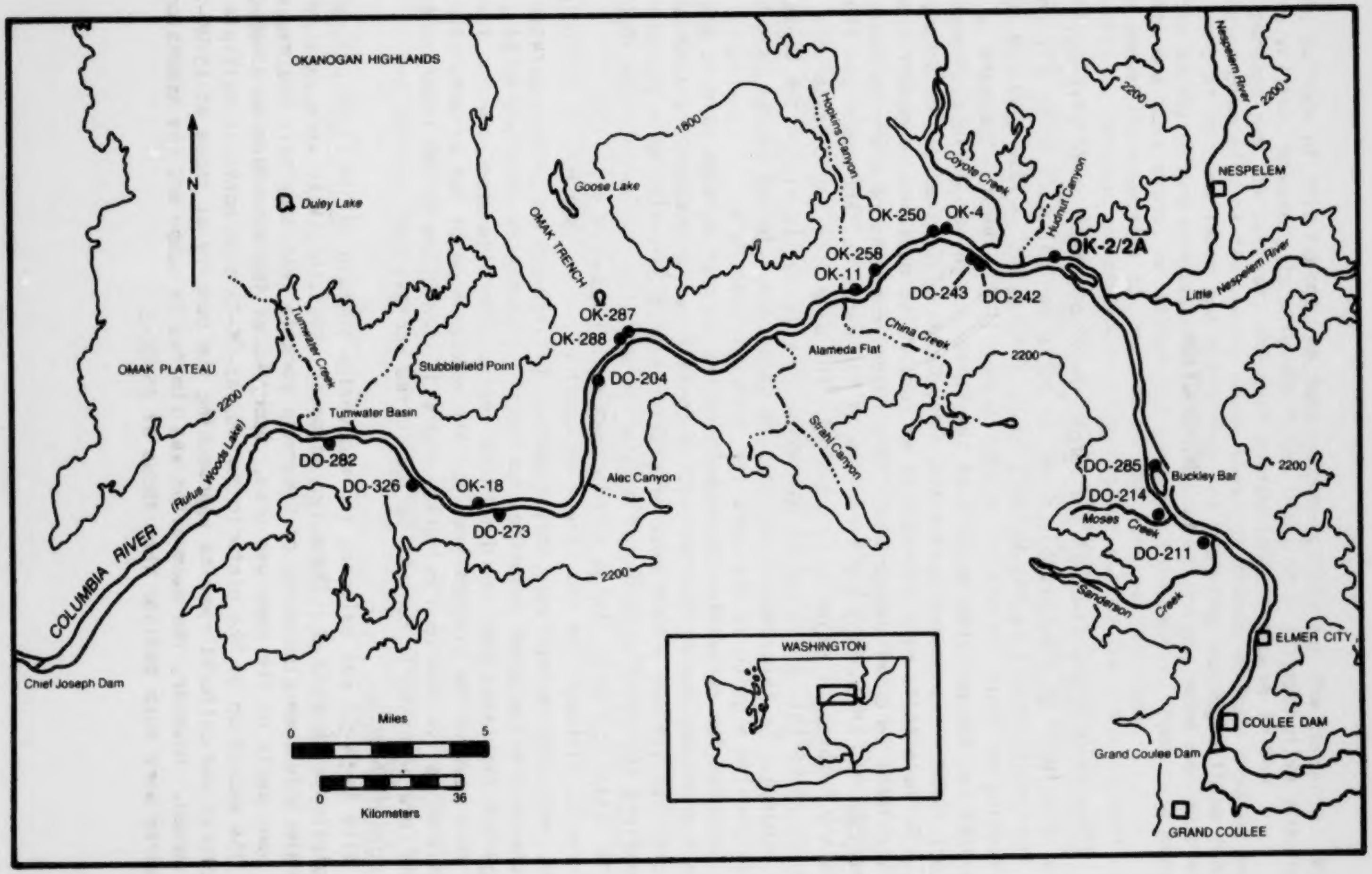

OKANOGAN HIGHLANDS
N
Duley Lake
OMAK PLATEAU
Tumwater Creek
Tumwater Basin
Stubblefield Point
OMAK TRENCH
Goose Lake
1800
Hopkins Canyon
Coyote Creek
Hudnut Canyon
2200
Nespelem River
NESPELEM
Little Nespelem River
OK-250
OK-4
OK-258
OK-11
OK-2/2A
DO-243
DO-242
OK-287
OK-288
DO-204
China Creek
Alameda Flat
Strahl Canyon
DO-285
Buckley Bar
DO-214
Moses Creek
DO-211
Sanderson Creek
ELMER CITY
COULEE DAM
Grand Coulee Dam
GRAND COULEE
DO-282
DO-326
OK-18
DO-273
Alec Canyon
COLUMBIA RIVER
(Rufus Woods Lake)
Chief Joseph Dam
Miles
0
5
0
36
Kilometers
WASHINGTON

Figure 1-1. Map of project area showing location of 45-OK-2 and 45-OK-2A.

SITE LOCATION AND DESCRIPTION

Sites 45-OK-2 and 45-OK-2A are on a low terrace on the right bank of the Columbia River in the upstream portion of the reservoir (Rufus Woods Lake) behind Chief Joseph Dam (Figure 1-2). These two long, narrow sites extend from River Mile (RM) 581 (the upstream end of 45-OK-2A) to RM 580.5 (the downstream end of 45-OK-2). Located at SE1/4, NW1/4, SW1/4, Section 32, T31N, R30E, and NE1/4, NE1/4, SW1/4, Section 32, T31N, R30E, respectively, 45-OK-2 and 45-OK-2A both lie within the Colville Indian Reservation in Okanogan County.

Upstream from the sites, Nespelem Bar begins just above RM 581, extending up to RM 582 (Plate 1-1 and Figure 1-2). Here the Nespelem River, the largest tributary in the reservoir, empties into the Columbia River from the east. The Nespelem Rapids begin above the mouth of the Nespelem River at RM 582.5, and extend upstream beyond RM 583. There are no other mapped rapids in the site vicinity, but there once may have been one downstream from Nespelem Bar where a slight riffle is now visible. Across the river from the site area Bissell Flats, a terrace at an elevation of 1200', tops steep cliffs (Plate 1-1 and Figure 1-2).

The terrace on which the sites lie is in Zone 1 of the physiographic zones defined for the project area (Campbell 1984d). It is bounded to the east and west by higher terraces, to the south by the river, and to the north by rock cliffs rising above steep talus slopes. A rocky slope separates the upstream and downstream portions of the terrace.

At the downstream end, the terrace is a relatively flat surface between 292 and 293 m in elevation (Figure 1-3). Cultural materials covering an area 300 m long and 30 to 45 m wide comprise 45-OK-2. The slight rise along the shore is a natural levee, and the linear depression with a perpendicular channel connecting it to the river is a remnant of a former river channel. Numerous surface depressions, indicative of subsurface structures, are visible.

The upstream end of the terrace, where 45-OK-2A is located, has a different topographic configuration. The bank rises to 291-292 m in elevation, above which the surface slopes gently to the 294 m contour (Figure 1-4). Approximately in the middle of the site, a deposit of boulders and cobbles is exposed at the surface, forming a small knoll. Site 45-OK-2A comprises cultural materials covering an area approximately 300 m long and 30 m wide at the upstream end of the terrace. Several surface depressions are visible at the downstream end of the site.

Vegetation in the immediate vicinity of 45-OK-2 and 45-OK-2A is typical of the shrub-steppe vegetation type defined by Erickson et al. (1977) and commonly found in physiographic Zone I of the project area. The amount of disturbance varies considerably, however. On the rocky slope above 45-OK-2 the vegetation is relatively undisturbed. Sage (*Artemisia tridentata*) is the dominant shrub, with a few scattered individuals of hackberry (*Celtis douglasii*), serviceberry (*Amelanchier alnifolia*), currant (*Ribes* sp.), rabbitbrush (*Chrysothamnus nauseosus*), and bitterbrush (*Purshia tridentata*). Patches of sumac (*Rhus glabra*) occur, extending down onto the flat in rocky

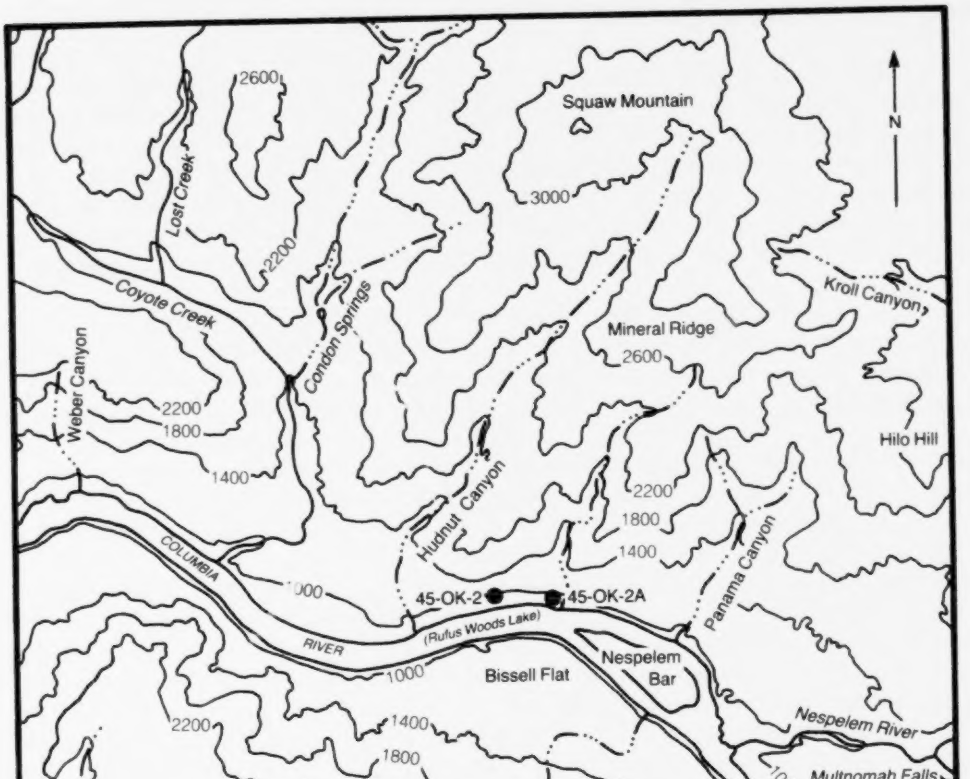

2600
Squaw Mountain
N
Lost Creek
3000
2200
Condon Springs
Coyote Creek
Kroll Canyon
Mineral Ridge
Weber Canyon
2600
2200
1800
1400
Hilo Hill
Hudnut Canyon
2200
1800
1400
Panama Canyon
COLUMBIA
1000
45-OK-2
45-OK-2A
(Rufus Woods Lake)
RIVER
1000
Bissell Flat
Nespelem Bar
2200
1400
Nespelem River
1800
Multnomah Falls
1000
Black Lake
2200
1800
Deep Canyon
Bailey Basin
0
1
Mile
School Creek
Kaiser Canyon
Rock Lake
China Creek

Figure 1-2. Map of site vicinity, 45-OK-2 and 45-OK-2A.

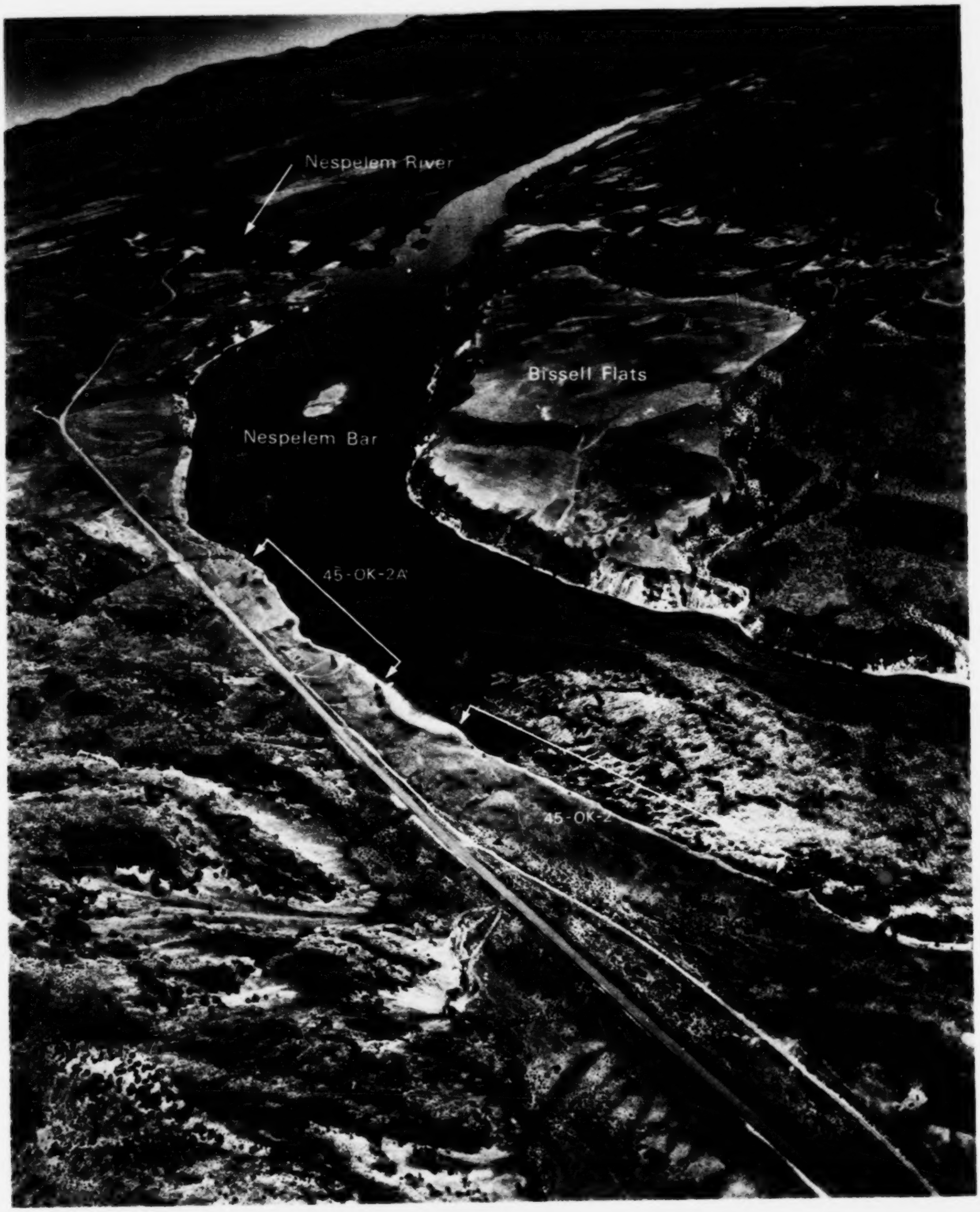

Nespelem River
Bissell Flats
Nespelem Bar
45-OK-2A
45-OK-2

Plate 1-1. Overview of 45-OK-2 (foreground) and 45-OK-2A (center left). View is upriver. USCE photograph S78047-OBL-3, June 28, 1978.

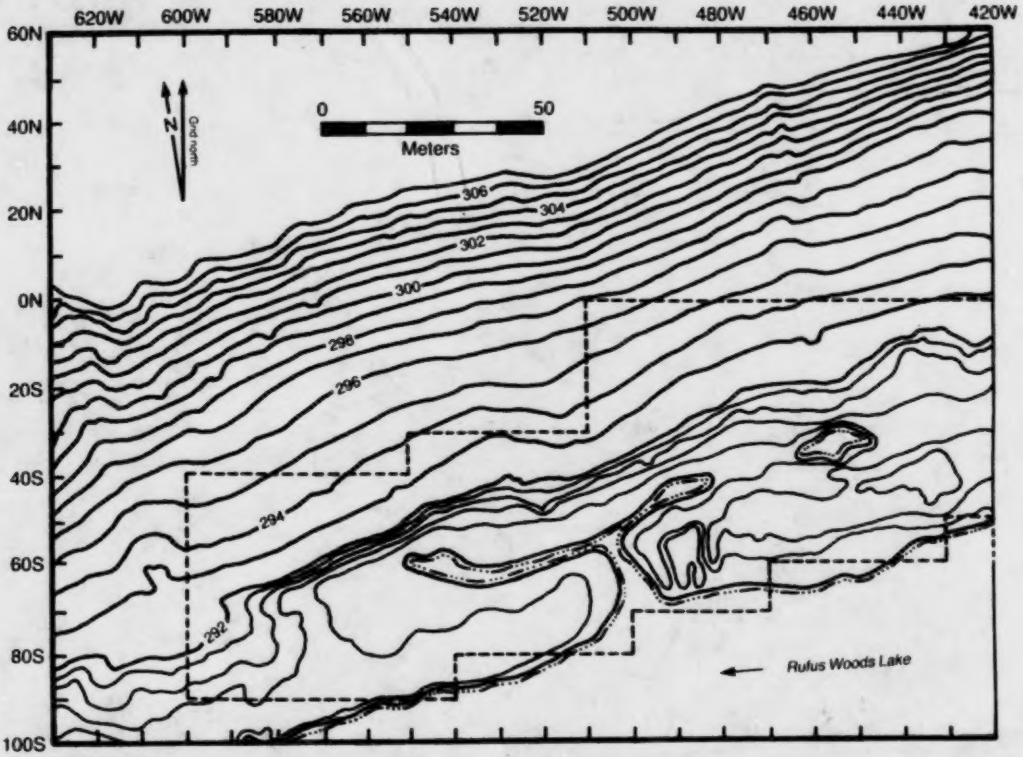

620W
600W
580W
560W
540W
520W
500W
480W
460W
440W
420W
60N
40N
20N
0N
20S
40S
60S
80S
100S
N
Grid north
0
50
Meters
306
304
302
300
298
296
294
292
Rufus Woods Lake

Figure 1-3. Topographic map of 45-OK-2, Section 1. Adapted from 1" to 50' scale map produced by the USCE from aerial photographs. Downstream portion photographed 1978, upstream portion photographed 1981 after 10' pool rise. Upstream portion of site had also been excavated and backfilled with heavy equipment, obscuring some of the surface depressions.

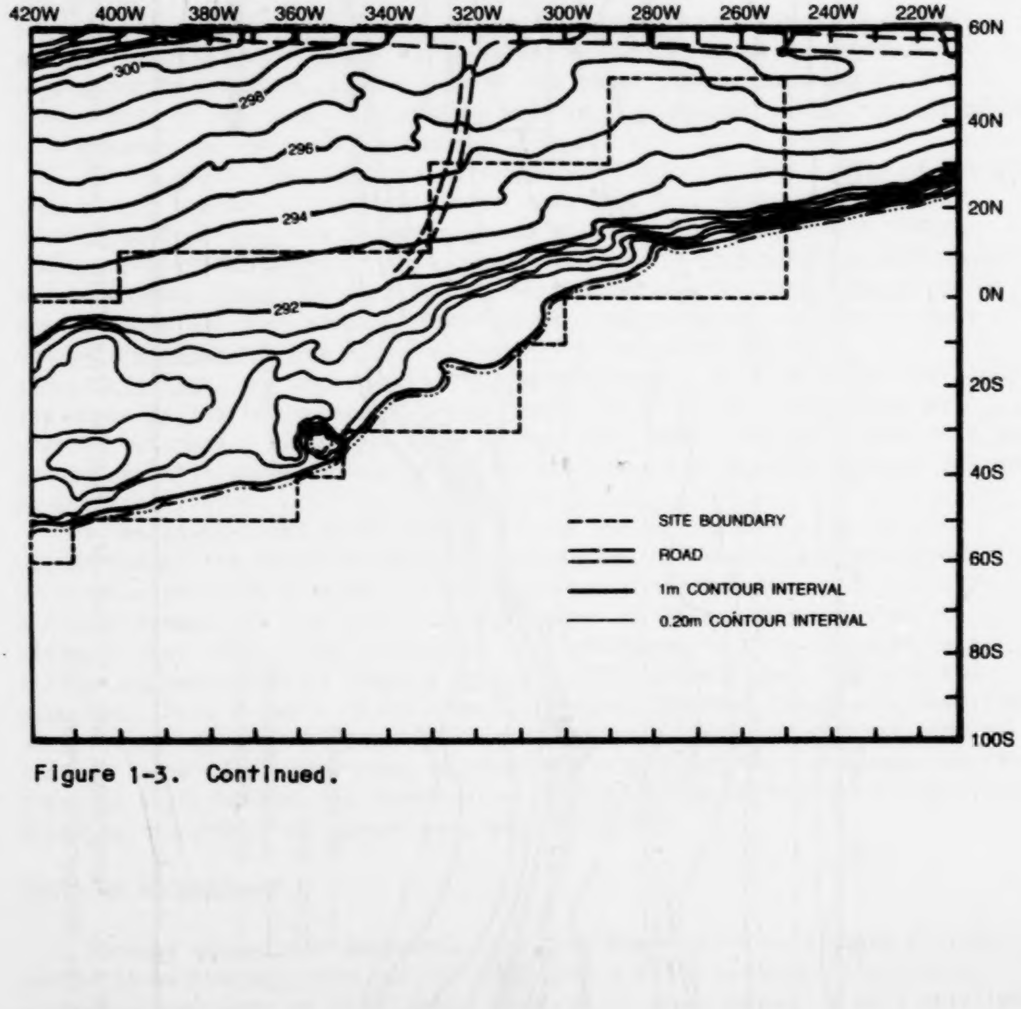

420W
400W
380W
360W
340W
320W
300W
280W
260W
240W
220W
60N
40N
20N
0N
20S
40S
60S
80S
100S
300
298
296
294
292
SITE BOUNDARY
ROAD
1m CONTOUR INTERVAL
0.20m CONTOUR INTERVAL

Figure 1-3. Continued.

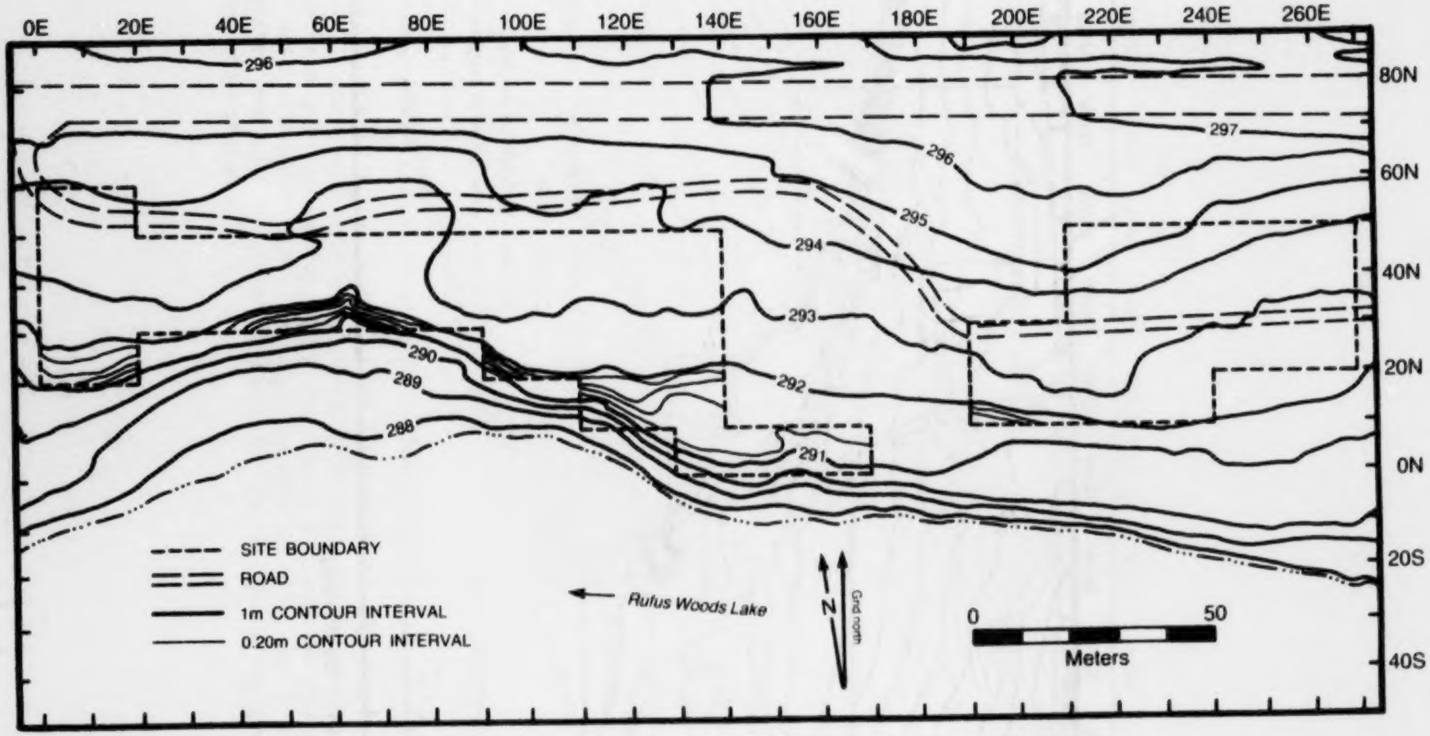

0E
20E
40E
60E
80E
100E
120E
140E
160E
180E
200E
220E
240E
260E
80N
60N
40N
20N
0N
20S
40S
296
297
296
295
294
293
292
291
290
289
288
SITE BOUNDARY
ROAD
1m CONTOUR INTERVAL
0.20m CONTOUR INTERVAL
Rufus Woods Lake
N
Grid north
0
50
Meters

Figure 1-4. Topographic map of 45-OK-2A. Adapted from 1" to 50' scale map produced by the USCE from aerial photographs taken 1978.

areas. The grasses are three-awn grass (*Aristida cristatum*), brome (*Bromus commutatus*), and bent grass (*Agrostis alba*). Dropseed grass (*Sporobilis cryptandrus*) becomes more common on the lower slope, and a dense field of it is found near the western end of the site. Giant ryegrass (*Elymus cinereus*) and a smaller species (*E. ambiguus*) occur on the lower flat area of the site itself, as do several patches of wild rose (*Rosa woodsii*). There is no evidence of a permanent riparian community, even on the lowest portions of 45-OK-2. Five ponderosa pines (*Pinus ponderosa*) stand on the shoreline between 45-OK-2 and 45-OK-2A; these are dying because of inundation since the pool rise. At the time of Osborne's excavations in 1950, twelve trees comprised the grove. Introduced plants indicating disturbance are quite common in the lower flat area. An elm (*Ulmus* sp.) growing near Surface Depression E is assumed to have been planted in association with a nearby homestead. The vegetation of 45-OK-2A is like that of the lower grassy slope at 45-OK-2 except that it has been disturbed by cattle to a greater extent, as indicated by a greater abundance of introduced species.

On the higher terraces, talus slopes, and draws within a mile of the site grow plants typical of rockland, rock, macrophyllous vine and shrub, and coniferous tree over shrub plant communities defined by Erickson (1970). These include the important root crops, balsamroot (*Balsamorhiza sagittata*), and lomatiums (*Lomatium* spp.), sage, and bunchgrass (*Agropyron spicatum*) on the terraces and open slopes. Serviceberry, bitterbrush, hackberry, mock orange (*Philadelphus lewisii*), western virgin's bower (*Clematis ligusticifolia*), and chokecherry (*Prunus virginiana*) grow in draws and along the edges of the talus slopes. Ponderosa pines grow in breaks among the granite outcrops. The larger draw to the west, Hudnut Canyon, leads to higher elevations with larger areas of all of the broadleaf vegetation types defined by Erickson (1970).

Sites 45-OK-2 and 45-OK-2A are within the ethnographically recorded boundaries of the Nespelem people. Trade goods and horse bones in house structures at 45-OK-2 establish that occupation of the site continued into historic times, but the site is not included in Ray's list of historic villages (Ray 1932). The failure of his informants to cite the area as a village suggests that at least a generation had passed since the site was occupied. This is more likely than the supposition that informants familiar with the village on the Nespelem River would have been unacquainted with a village three miles downriver, or that they conflated the two areas. By the time the south half of the reservation was opened for settlement in 1916, the Nespelem apparently no longer made use of 45-OK-2.

PREVIOUS ARCHAEOLOGY

Because management decisions regarding these sites were based at least partially on findings from earlier projects, a brief summary of previous archaeological work at 45-OK-2 and 45-OK-2A is given below. A more detailed discussion of previous projects in the reservoir can be found in the project's research design (Campbell 1984d).

Site 45-OK-2 was first officially recorded by the Smithsonian Institution River Basin Survey in 1947 (site records on file, OPA). Included in the site boundaries were all the cultural materials on the long terrace where 45-OK-2 and 45-OK-2A are situated. Another area uphill from the terrace, exhibiting a midden with shell, but devoid of housepits, was designated as 45-OK-2A. It has since been eradicated by road relocation. Site 45-OK-2 was among the sites recommended for testing or excavation in the preliminary appraisal of the reservoir (Osborne 1949).

A project jointly sponsored by the University of Washington and the River Basin Survey followed up these recommendations in 1950. At 45-OK-2, 14 housepits were defined and seven were tested (Osborne et al. 1952). These include Housepits 1-5, at current site 45-OK-2, Housepit 8, at current site 45-OK-2A, and Housepit 12, which apparently lies east of current site 45-OK-2A. Pits and trenches were dug to depths of 2.0-3.5 feet and excavation was terminated whenever a housepit floor or fireplace was found. The researchers concluded that this site, like others in the reservoir, contained evidence of but a single, relatively recent, cultural horizon (Osborne et al. 1952).

Site 45-OK-2 was relocated and rerecorded in a survey by Washington State University in 1970, but the upstream portion of Osborne's 45-OK-2 was mistakenly called 45-OK-2A. This designation was followed in the subsequent testing project conducted by Washington State University (Lyman 1975). Four units were excavated at what is now known as 45-OK-2, and 45-OK-2A was not tested. One of the four excavation units cut into the wall of Osborne's Housepit 2. Two more units were placed into and on the edge of Osborne's Housepit 3 (Lyman's Housepit 2), but the housepit walls and floor were not recognized (Lyman 1975, field notes).

CHIEF JOSEPH DAM CULTURAL RESOURCES PROJECT DATA RECOVERY

Investigations of the Chief Joseph Dam Cultural Resources Project were guided by the goal of acquiring sufficient data to characterize the prehistoric settlements and their development. The general criteria for selecting sites for testing and mitigation are discussed in detail in Campbell (1984d); here we discuss only the management decisions made specifically for 45-OK-2 and 45-OK-2A.

For management purposes, the CJDCRP has treated 45-OK-2 and 45-OK-2A as separate sites. The two site areas may have been connected by a continuous distribution of cultural materials along the beach prior to to the creation of Rufus Woods Lake, but they are now separated by a 300 m stretch of shoreline devoid of cultural materials.

Site 45-OK-2 was excluded from the testing phase of the CJDCRP because subsurface information already was available from Osborne and Lyman's tests. Although Osborne also tested in the area now called 45-OK-2A, this site was retested by CJDCRP because of the possibility of an old component missed by Osborne's testing. The CJDCRP test excavations at 45-OK-2A were limited to the western 150 m of the site; units were placed in the vicinity of two large, deep housepit depressions (Osborne's Housepits 8 and 9) and south of these depressions toward the river, and west toward the western boundary of the site. The results of testing are reported in Leeds et al. (1981).

Osborne's data, which demonstrated a contact period occupation at 45-OK-2, was the basis for selecting 45-OK-2 for mitigation. Surface reconnaissance indicated even more surface depressions than Osborne had noted. As a contact period large winter village site, 45-OK-2 was considered unique. Investigators believed a data base from this site could be used to answer questions about the late prehistoric/historic period, especially the effects of contact, and the archaeological applicability of the Sanpoil-Nespelem ethnographic model. Although no evidence of an early component was found at 45-OK-2A during testing, the site was selected for salvage because of its association with 45-OK-2.

Site 45-OK-2 was excavated during two field seasons by a professional crew of 23 during the winter of 1979-1980, and by a field school of 20 students, sponsored by the University of Washington, Department of Anthropology, during the summer of 1980. A professional crew of nine excavated 45-OK-2A during the winter of 1979-1980.

Mitigation at these sites followed the general data recovery plan designed for the project (outlined in detail in Campbell 1984d) with some site-specific variations. The following sections summarize major aspects of the recovery procedures, such as sampling, means of horizontal and vertical control, and screen size, which most affect the manipulation and interpretation of the recovered assemblage.

SAMPLING STRATEGY AND TACTICS

The sampling strategy applied at 45-OK-2 involved two stages; first, a probabilistic sample to provide an unbiased estimate of the site contents, and second, the excavation of purposive units, selected on the basis of information obtained in probabilistic sampling. The same probabilistic sampling design was employed at 45-OK-2A but the purposive sampling stage was not reached.

Probabilistic Sampling Design

A probabilistic sampling design was developed specifically for 45-OK-2 and 45-OK-2A to independently sample housepit and nonhousepit areas with a higher sampling intensity for housepit areas, to maximize the possibility of finding buried house structures, and to ensure spatial dispersion of sample elements over the long sites. For clarity, we first describe the sampling design procedurally, then we discuss the rationale for various aspects of the design.

Preparatory to excavation, field maps were made of both sites for sampling purposes which indicated site boundaries and the location of surface depressions. Osborne's numbering system was followed where possible. Surface depressions which were not numbered by Osborne were given letter designations. Each site was then gridded into 10 x 10-m blocks, starting from the northwest corner. All blocks containing any portion of a surface depression were assigned to the **housepit stratum** while the remaining units were included in the **nonhousepit stratum**. Subsequent procedures differed for the housepit and nonhousepit strata.

Within the housepit stratum, contiguous 10 x 10-m blocks were grouped to form secondary strata, designated by numbers (Stratum 1, etc.). As these are natural divisions, they vary in size, depending on the number and spacing of housepits. At 45-OK-2, the 3,400 sq m of the housepit stratum were divided initially into five secondary strata, with a sixth being added after field work commenced (Table 1-1, Figure 1-5). They range in size from Stratum 6, two 10 x 10-m blocks enclosing two contiguous surface depressions, to Stratum 4, comprising 15 blocks and eight depressions. The 1,300 sq m of housepit stratum at 45-OK-2A includes Stratum 1, nine 10 x 10-m blocks enclosing three surface depressions, and Stratum 2, consisting of four 10 x 10-m blocks and 1 surface depression (Table 1-1, Figure 1-6).

Sample selection in the housepit stratum involved randomly selecting three 1 x 2-m units from each primary cluster. These were designated as first, second, or third stage excavation units, corresponding to the order of their selection. Three 1 x 2-m units were selected randomly from each 10 x 10-m block in Strata 1 and 2, 45-OK-2A, and Strata 1, 3, and 4, 45-OK-2. Strata 2 and 5 at 45-OK-2 were not scheduled for excavation because of the extent of Osborne's excavations in these areas.

The nonhousepit stratum was divided into an arbitrary number of secondary strata of roughly equal area, designated by letters (Stratum A, etc.). At 45-OK-2, the initially defined area of 15,400 m^2 was divided into six secondary strata, Strata A-F, all of which totalled 2,600 m^2 except Stratum F, which included only 2,400 m^2 (see initial definitions, Table 1-1). The areas were changed by strata redefinitions which took place after excavation had begun. The 5,600 m^2 of nonhousepit stratum at 45-OK-2A was divided into Stratum A and Stratum B, each including 2800 m^2.

Sample selection was accomplished differently in the nonhousepit stratum than in the housepit stratum. A random sample of 10 x 10-m blocks was chosen from each secondary stratum. Three 1 x 2-m units then were selected at random from each of the selected blocks, and their order of selection designated as described above. At 45-OK-2, five 10 x 10-m blocks were selected randomly from Stratum A-F (Figure 1-5), while at 45-OK-2A, six 10 x 10-m blocks were selected from Strata A and B (Figure 1-6).

The sampling plan described above is quite complex. It is a stratified sampling design, with the primary level of stratification being the distinction between housepit and nonhousepit areas. The sampling designs applied to the two major strata are independent, having a different method of sample selection and different sampling intensity. In both the housepit and nonhousepit strata, the second level of stratification further divides the site into multiple sampling universes, insuring spatial dispersal of the sample, and providing greater flexibility for the contingencies of excavation. The sampling plan applied to the nonhousepit strata is random cluster sampling, the 10 x 10-m blocks being the clusters. Because all 10 x 10-m blocks in the housepit strata were scheduled for excavation the plan can be termed systematic cluster sampling.

Table 1-1. Area of sampling strata and effect of redefinition, 45-OK-2 and 45-OK-2A.

Site	Primary Strata			Secondary Strata			# of 10 x 10 m Blocks	Changes in 10 x 10 m Block Assignments
	Designation	Initial Area(m^2)	Final Area(m^2)	Designation	Initial Area(m^2)	Final Area(m^2)		
45-OK-2	House-pit	3,500	3,400	1	700	400	4	5 blocks reassigned to Stratum A, 1 added from unassigned.
				2	400	400	4	
				3	500	500	5	
				4	1,500	1,500	15	
				5	400	400	4	
				6	-	200	2	1 block added from Stratum C, 1 block added from unassigned.
	Nonhouse-pit	15,400	15,800	A	2,600	3,100	31	5 blocks added from Stratum 1
				B	2,600	2,600	26	
				C	2,600	2,500	25	1 block reassigned to Stratum 6
				D	2,600	2,600	26	
				E	2,600	2,600	26	
				F	2,400	2,400	24	
45-OK-2A	House-pit	-	1,300	1	-	900	9	
				2	-	400	4	
	Nonhouse-pit	-	5,600	A	-	2,800	28	
				B	-	2,800	28	

[1] Distinction between initial and final areas not applicable at 45-OK-2A as no changes were made.

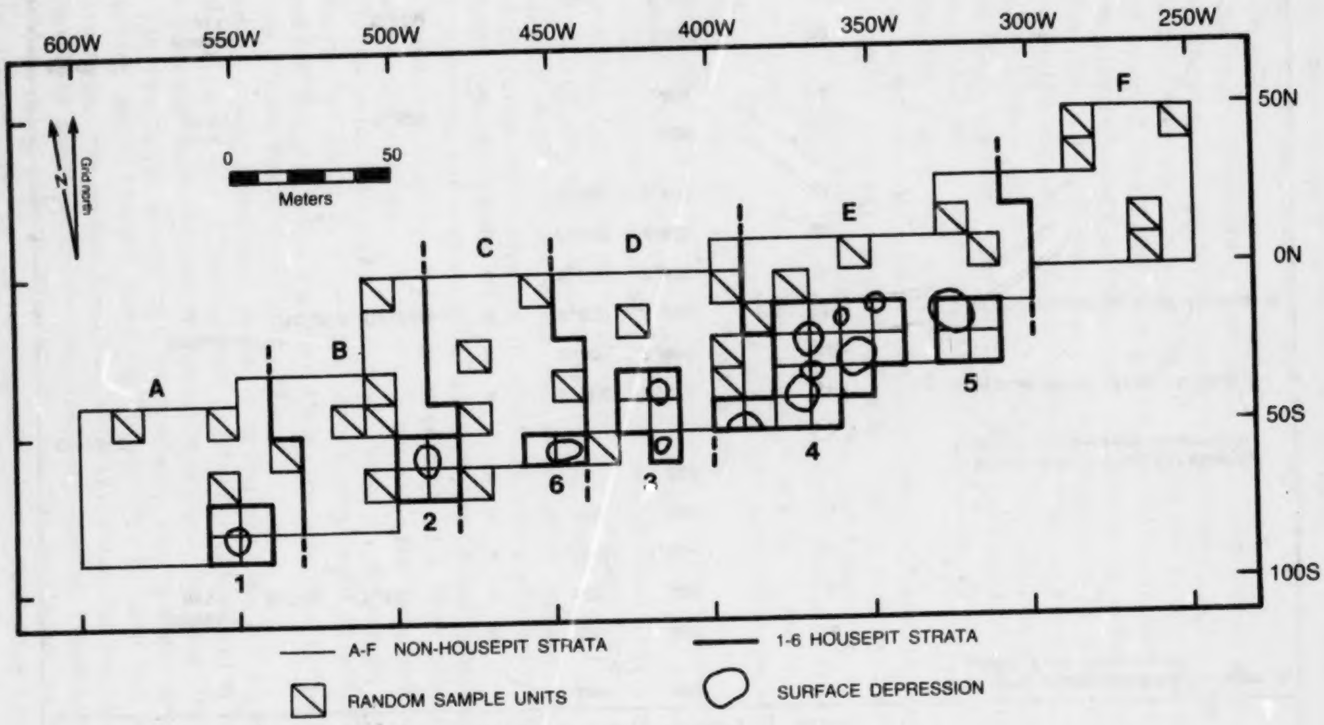

600W
550W
500W
450W
400W
350W
300W
250W
50N
0N
50S
100S
Grid north
N
0
50
Meters
A
B
C
D
E
F
1
2
3
4
5
6
A-F NON-HOUSEPIT STRATA
1-6 HOUSEPIT STRATA
RANDOM SAMPLE UNITS
SURFACE DEPRESSION

Figure 1-5. Definition of sampling strata and location of 10 x 10 m blocks selected for excavation, 45-OK-2.

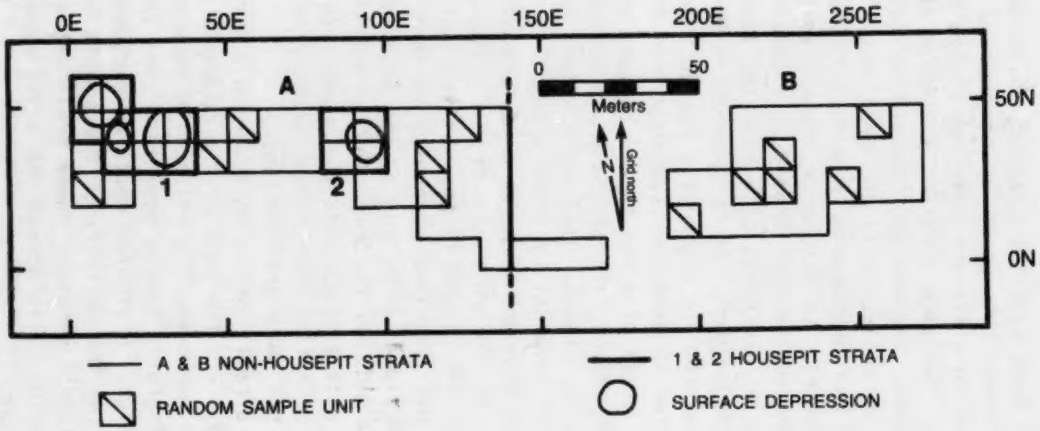

0E
50E
100E
150E
200E
250E
50N
0N
A
B
1
2
0
50
Meters
Grid north
N
A & B NON-HOUSEPIT STRATA
1 & 2 HOUSEPIT STRATA
RANDOM SAMPLE UNIT
SURFACE DEPRESSION

Figure 1-6. Definition of sampling strata and location of 10 x 10 m blocks selected for investigation, 45-OK-2A.

The probabilistic sample is not used as such in the research reported here. However, the strategic aspects of this design are discussed below for future researchers interested in rigorous quantitative analysis of the data bases from 45-OK-2 and 45-OK-2A, or in developing sampling plans for similar sites.

Stratified sampling is used when the sampling universe contains at least two kinds of phenomena different in respect to the problem being studied. Sample elements are assigned to different sampling strata on the basis of the relevant characteristics and then each stratum is treated as an independent universe tor sampling purposes. Because each sample is independent, the two samples do not even have to be collected in the same way. They are both probabilistic samples which can be compared when certain factors such as intensity are taken into account. In this case, random sampling of undifferentiated housepit and nonhousepit areas would interfere with getting accurate, unbiased estimates of the kinds of activities taking place at the site, one of the goals of the project. It is apparent from previous work on the Plateau, although not necessarily rigorously tested, that activities conducted within houses differ in kind and frequency from those conducted outside, and that these two kinds of areas should be sampled independently. Because the samples are independent, the strata could be sampled at different intensities without introducing biases. Thus more effort could be devoted to housepit areas, of particular interest at these sites.

Although the distinction between housepit areas and nonhousepit areas is a natural division suggested by the structure of the cultural deposits themselves, the line drawn on the ground to delimit the two is necessarily arbitrary. Not enough work has been done on housepits that we can be certain where the housepit, as a functional unit, begins and ends--whether it includes the walls, the built-up area outside the walls, or an entryway. We can, therefore, only approximate with surface data the subsurface line in which we are really interested. Approximating curvilinear boundaries with a rectilinear grid introduces yet more arbitrariness.

The secondary level of stratification is based on natural divisions--the spacing of surface depressions--in the case of the housepit stratum and is arbitrary in the case of the nonhousepit stratum. In each case, the strata allow the excavator to meaningfully sample something less than the entire housepit or nonhousepit stratum. A stratum could be excluded, such as Stratum 5 at 45-OK-2, without affecting the validity of the sample from the other strata. Also, in the nonhousepit stratum, these arbitrary subdivisions insure spatial dispersion of excavation units across the site, especially important given the low sample intensity.

Cluster sampling, in which two nested scales of sampling elements are defined, was used for sampling both housepit and nonhousepit strata. The 1 x 2-m units, the units actually excavated, are the smaller scale sampling element. While this size is practical for excavation, it would be costly to define the site boundaries and internal strata boundaries at a resolution of 1 x 2 m. Therefore, a larger scale sampling element, the 10 x 10-m blocks, each of which contains 50 1 x 2-m units, are used instead. Any block larger than 1 x 2 m would provide greater ease in referential control and developing the sampling plan; the 10 x 10-m block size was chosen because it provides an optimal mesh for the identification of macrospatial structure. The houses encountered in the project area are commonly between eight and twelve meters in diameter, and are difficult to recognize if encountered in a single unit. Therefore, there is a greater likelihood of encountering and identifying houses or outside activity areas by randomly selecting a 10 x 10 m block and then selecting multiple units within it, than by randomly selecting the same number of 1 x 2-m units from anywhere. This is particularly important in the nonhousepit stratum given the low sampling intensity.

Although there was no random sampling of clusters in the housepit stratum is still qualifies as cluster sampling. The 1 x 2-m units were not assigned individually to the housepit stratum, but in clusters of 50, and the probabilities associated with drawing any given first, second, or third stage 1 x 2-m units are different than in a non-clustered design. Because the clustes were not sampled, they serve primarily as arbitrary divisions which systematically disperse the sample within the housepit stratum.

Sampling at 45-OK-2

All probabilistic sampling at 45-OK-2 took place during the November 1979 to February 1980 field season. The details of strata definition and sample selection are complicated by redefinitions of sampling strata which took place after selections had been made and excavation begun. Table 1-1 summarizes the effects of strata redefinitions. The accuracy of the sampling map was checked on the ground when field work commenced, and adjustments made in several strata. Figures 1-7 through 1-11 show the details of strata definition, unit selection, and unit excavation for Strata A-D, 1-4, and 6. Strata E, F, and 5 are not illustrated as no units were excavated in these areas. Sample implementation is summarized in Table 1-2.

Excavation in the nonhousepit strata was restricted to first stage sample units in those 10 x 10-m blocks imperiled by the pool rise scheduled for late February 1980. Excavation therefore proceeded in an uphill direction south to north. The rapid decline of cultural materials uphill indicated that the site boundary lay south of the boundary used for sampling, and the northernmost, or highest units in Strata A, B, C, and D, were not excavated (Figures 1-7 through 1-10). Excavation also proceeded from west to east, and no units were excavated in Strata E or F due to lack of time.

Data recovery efforts proceeded within Strata 1, 3, 4, and 6, also from east to west, at the same time as investigations in the nonhousepit strata. Strata 2 and 5 were not included in the probabilistic sample because Osborne's trenches decreased the integrity of the houses in these strata.

Excavation of the first stage units selected for Stratum 1 revealed new information which led to a redefinition of the stratum. The five westernmost units had been included in the housepit stratum because of several small pits: excavation showed that these were not structural remains but recent pits, perhaps dug by looters, and the units were reassigned to Stratum A (Figure 1-7). Housepit 5 was found to be slightly east of the location shown on the sampling map. It extended into block 70S550W, which was therefore switched

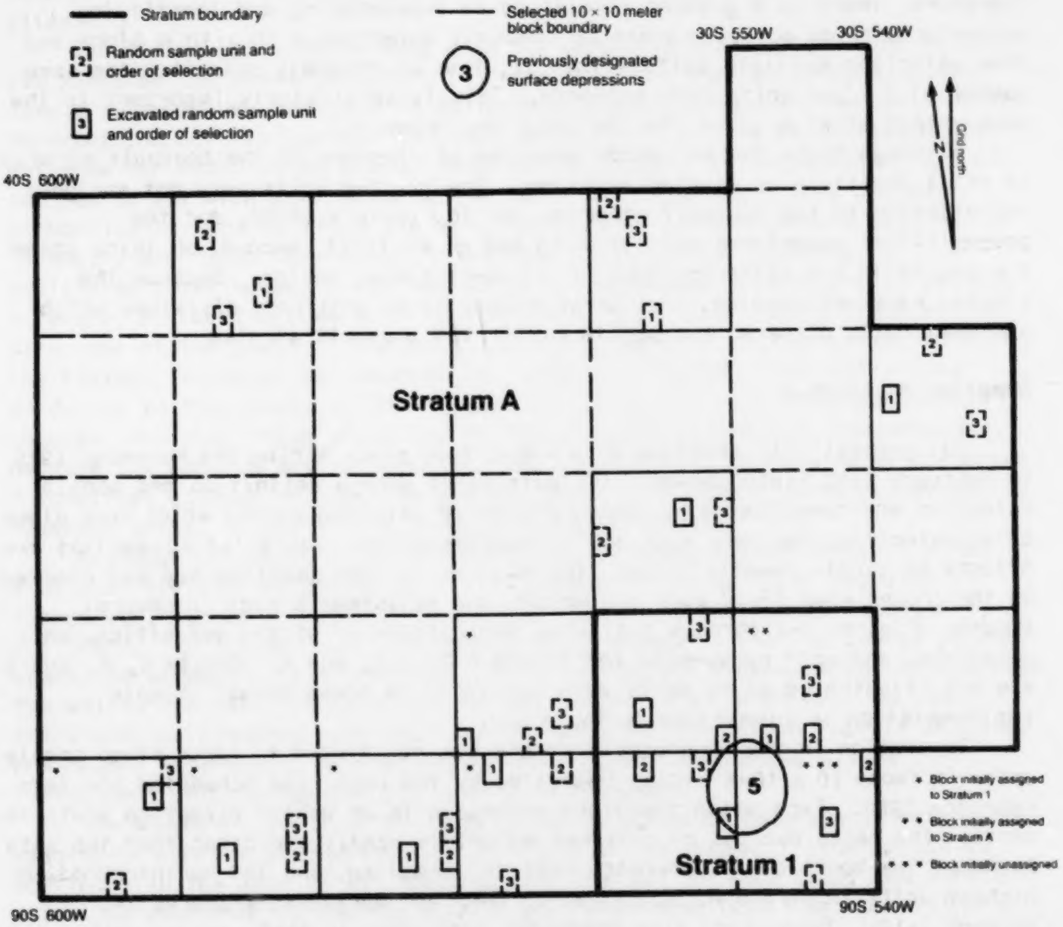

Stratum boundary
Selected 10 × 10 meter block boundary
Random sample unit and order of selection
Previously designated surface depressions
Excavated random sample unit and order of selection
30S 550W
30S 540W
40S 600W
Grid north
N
Stratum A
Stratum 1
5
90S 600W
90S 540W
• Block initially assigned to Stratum 1
• • Block initially assigned to Stratum A
• • • Block initially unassigned

Figure 1-7. Details of strata definition and selection and excavation of probabilistic units, Strata 1 and A, 45-OK-2.

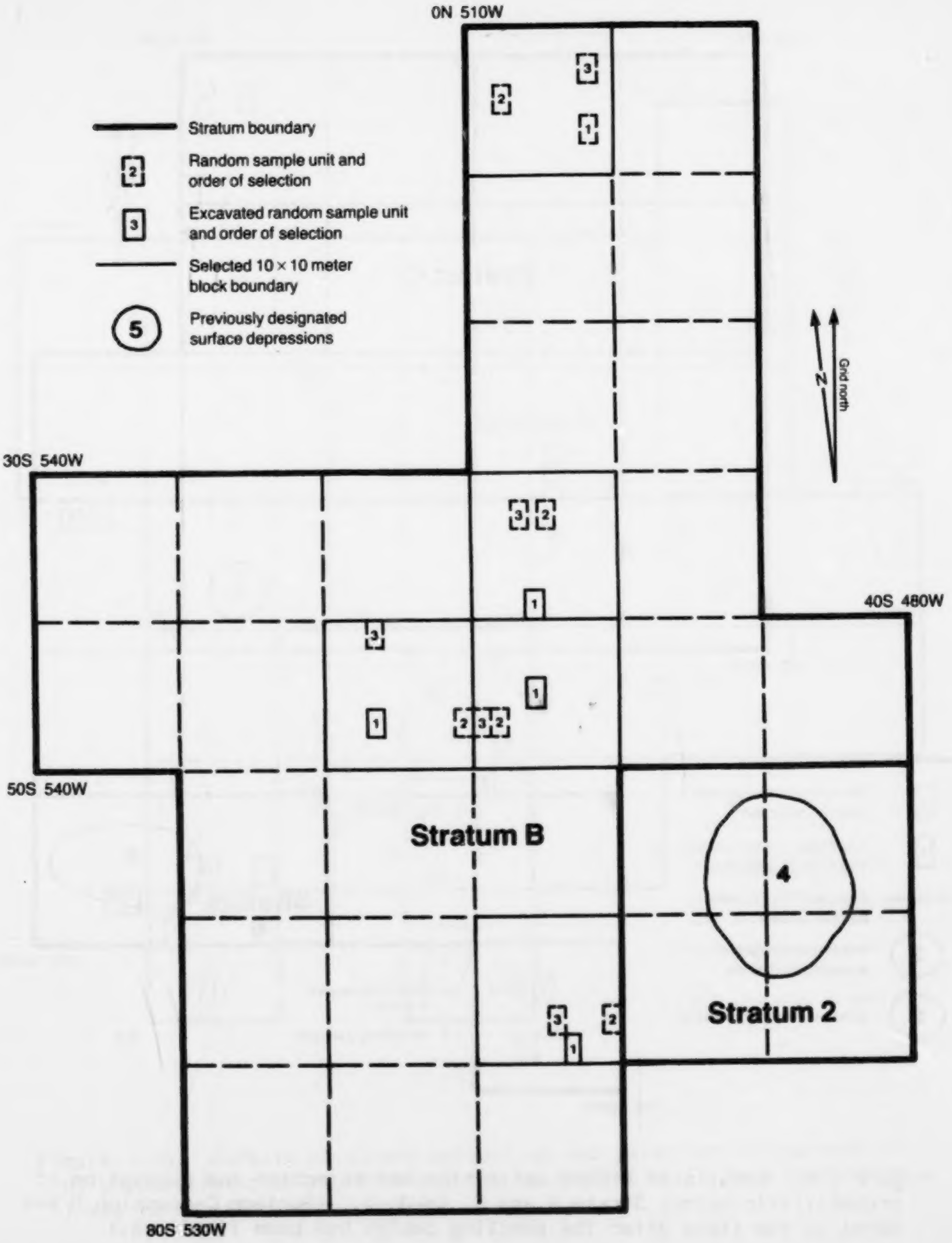

0N 510W
Stratum boundary
Random sample unit and order of selection
Excavated random sample unit and order of selection
Selected 10 × 10 meter block boundary
Previously designated surface depressions
5
Grid north
N
30S 540W
40S 480W
50S 540W
80S 530W
Stratum B
Stratum 2
4

Figure 1-8. Details of strata definition and selection and excavation of probabilistic units, Strata 2 and B, 45-OK-2.

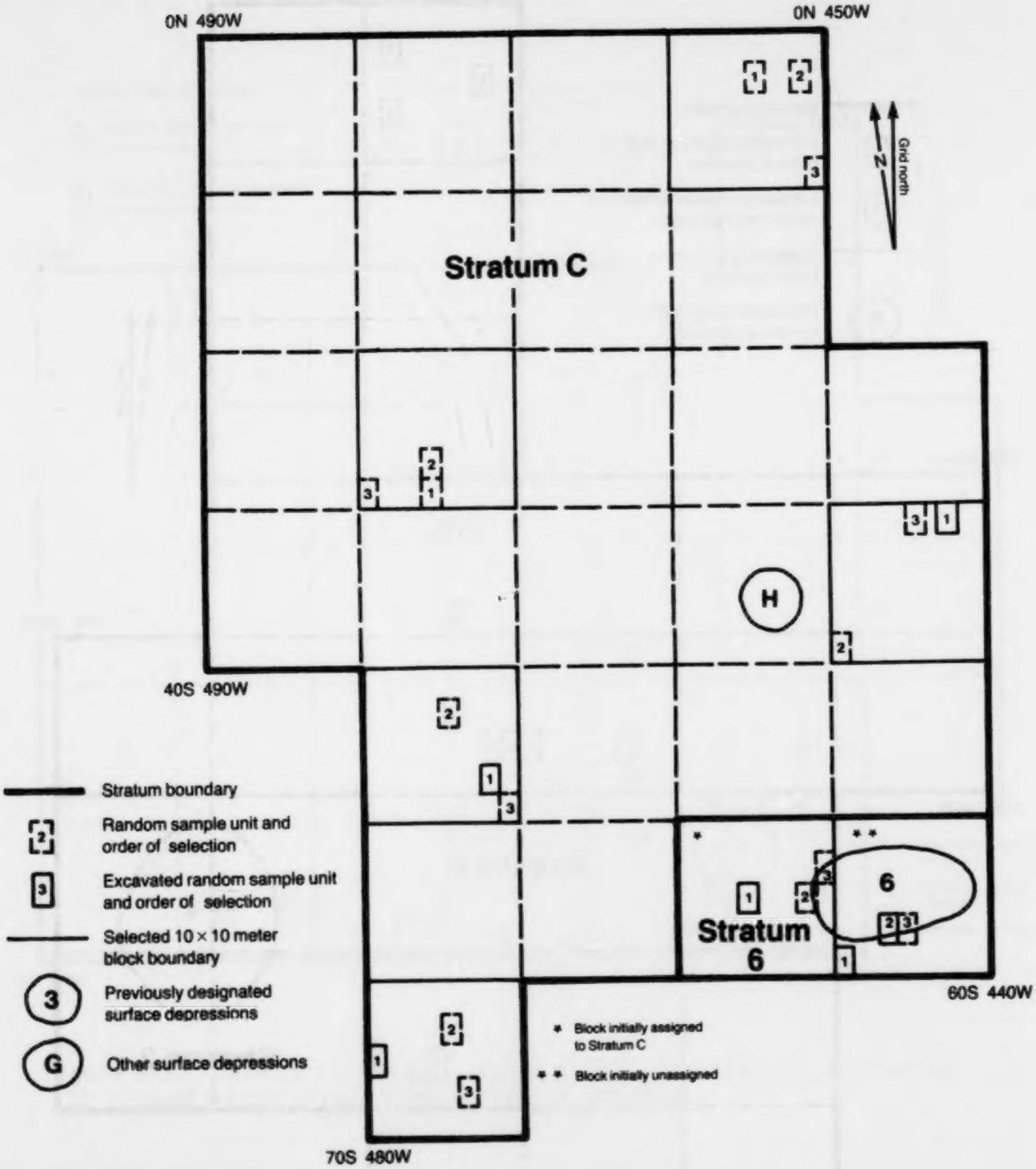

0N 490W
0N 450W
Grid north
N
Stratum C
H
40S 490W
60S 440W
70S 480W
Stratum 6
6
1
2
3
Stratum boundary
Random sample unit and order of selection
Excavated random sample unit and order of selection
Selected 10 × 10 meter block boundary
Previously designated surface depressions
Other surface depressions
G
* Block initially assigned to Stratum C
* * Block initially unassigned

Figure 1-9. Details of strata definition and selection and excavation of probabilistic units, Strata 6 and C, 45-OK-2. (Surface Depression H was noted in the field after the sampling design had been finalized.)

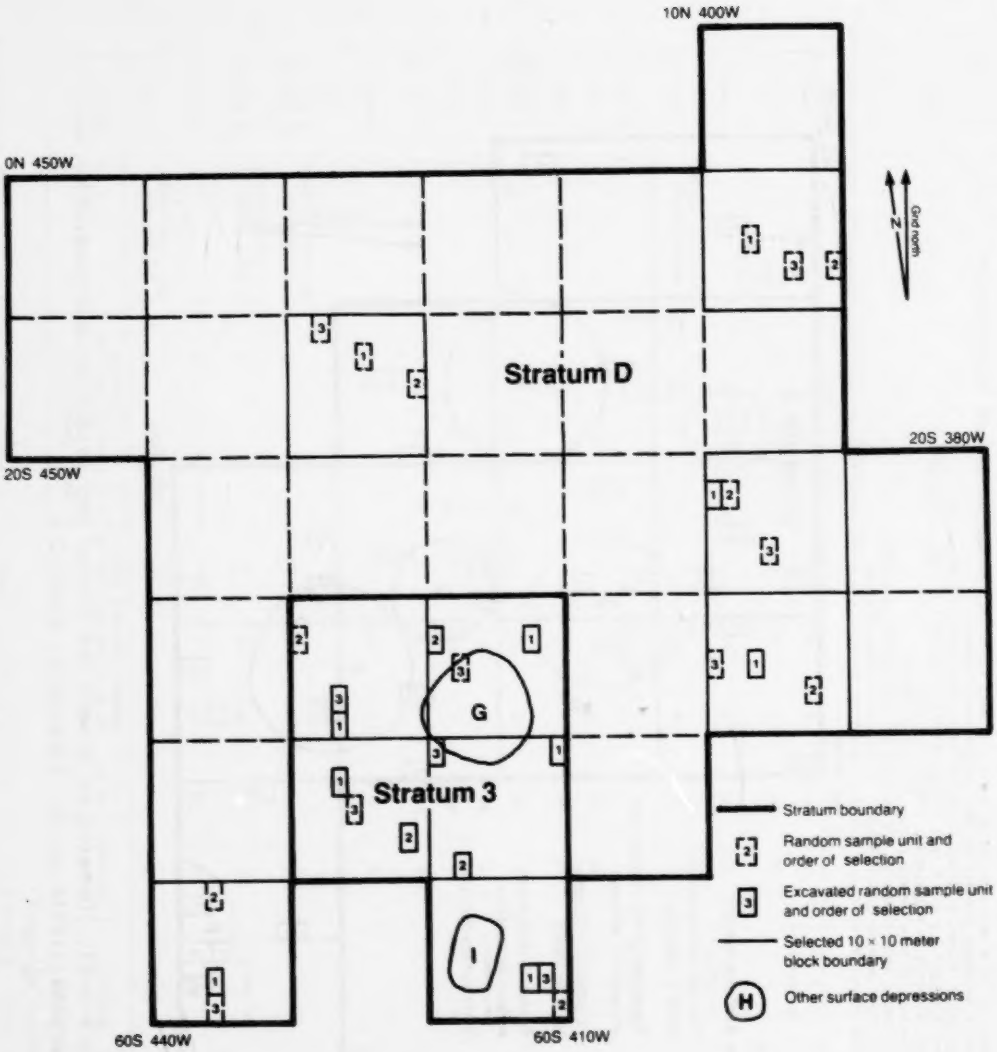

10N 400W
0N 450W
N
Grid north
Stratum D
20S 380W
20S 450W
G
Stratum 3
I
60S 440W
60S 410W
Stratum boundary
Random sample unit and order of selection
Excavated random sample unit and order of selection
Selected 10 × 10 meter block boundary
H
Other surface depressions

Figure 1-10. Details of strata definition and selection and excavation of probabilistic units, Strata 3 and D, 45-OK-2. (Surface Depression I was later discounted.)

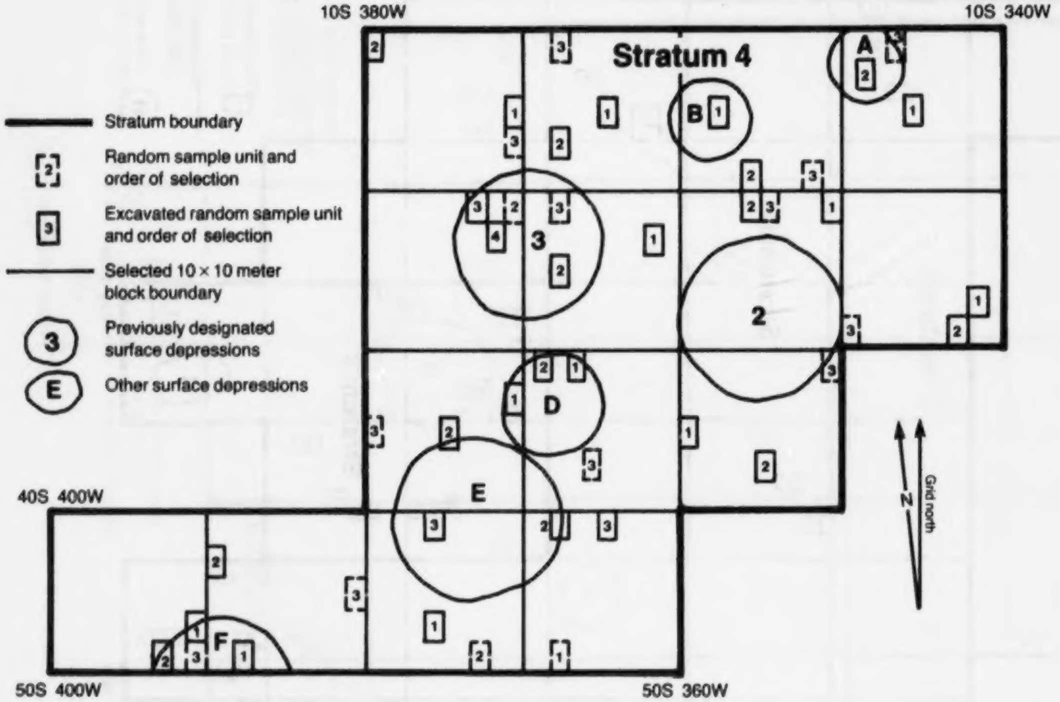

10S 380W
10S 340W
Stratum 4
Stratum boundary
Random sample unit and order of selection
Excavated random sample unit and order of selection
Selected 10 × 10 meter block boundary
Previously designated surface depressions
Other surface depressions
A
B
2
3
D
E
F
Grid north
N
40S 400W
50S 400W
50S 360W

Figure 1-11. Details of strata definition and selection and excavation of probabilistic units, Stratum 4, 45-OK-2.

Table 1-2. Execution of probabilistic sample, 45-OK-2 and 45-OK-2A, and purposive sample, 45-OK-2.

Site	Primary Stratum	Secondary Stratum	# of 10 m^2	# of 10 m^2 Chosen	# of 1x2 m^2 Chosen	# of 1x2 m^2 Excav.	Sample Completion[1]			Substitutions	Purposive Units
							0	First	First and Second		
45-OK-2	Housepit	1	4	4	12	8			4	1 third stage for first stage	1 1x2-m
		2	4	0[2]					0		1 2x2-m
		3	5	5	15	10			5	2 third stage for second stage	4 2x2-m
		4	15	15	45	30			15	3 third stage for second stage	41 2x2-m[9] 5 1x2 m[6]
		5	4	0[2]					0		none
		6	2	4	12	4			4		15 2x2-m
	Nonhousepit	A	31	4	12	2	2[4]	2			5 1x2-m[8]
		B	26	5	15	4	1[4]	4			none
		C	25	5	25	3	2[4]	3			none
		D	26	5	15	3	2[4]	3			7 2x2-m 7 1x2-m[5]
		E[3]	26	5	15	0					none
		F[3]	24	5	15	0					none
	Unassigned										1 1x2-m[7]
45-OK-2A	Housepit	1	9	9	27	7	4	3	2	1 second stage for first stage	none
		2	4	4	12	4	1	2	1		none
	Nonhousepit	A	28	6	18	12			6		none
		B	28	6	18	12		6			none

[1] Indicates number of 10 x 10-m blocks in which no units, first stage units only, or first and second stage units were excavated.
[2] Not excavated because of disturbance by previous investigations.
[3] Five initially were selected, but 70S550W was reassigned to Stratum 1.
[4] Not excavated because lowest priority, out of danger.
[5] Randomly selected in a different sample, see text.
[6] Includes 346S79W, a 2 x 2 m unit which is half in Stratum D, half in Stratum 4.
[7] Unit 101S597W, placed in possible burial cairn outside site boundaries.
[8] Originally selected randomly as part of Stratum 1 sample.
[9] Includes 1 2 x 2 m unit and 1/2 of a 2 x 2 m unit which fell outside the sampling stratum boundary.

from Stratum A to Stratum 1, and into 80S550W which was added to Stratum 1 (Figure 1-7). Three 1 x 2 m sample units were selected for this block which had previously lain outside the site boundaries. As block 70S550W had been randomly selected for sampling in Stratum A, three 1 x 2-m units had already been chosen.

Housepit Stratum 6 (Figure 1-9) also was defined after field work began. A slight depression in this area initially interpreted as a natural drainage channel was determined to be Osborne's Housepit 6. Block 50S460W, which included the western end of the feature, was reassigned from Stratum C to Stratum 6. Block 50S450W, which previously had not been included in the site boundaries, also was added to complete this stratum. Three 1 x 2-m units were selected randomly from each of these two blocks.

By the end of the winter 1980 field season, two random units had been excavated in each 10 x 10-m block Strata 1, 3, 4, and 6 (Figures 1-7 through 1-11). These were the first and second stage units except in six cases (Table 1-2) where third stage units were substituted for first or second stage units which were off the bank or otherwise unexcavable.

Purposive sampling--initiated during the first winter field season and the sole focus of data recovery during the ensuing summer field school session--was used to fulfill several different goals which were developed as excavation progressed. The goals focus primarily on housepits; on testing surface depressions not tested in the probabilistic sample, on obtaining larger samples of buried structures exposed in housepit and nonhousepit strata, and on obtaining extensive horizontal coverage of selected structures. Also, areas outside housepits were excavated where the complexity of cultural materials suggested that activity areas might be definable. The distribution of purposive units by sampling strata is shown in Table 1-2 and the locations are shown in Figure 1-12.

Goal 1: to verify walls and obtain floor dates from Housepits 2, 4, and 5. To meet this goal, a 2 x 2-m unit was excavated on the rim of both Housepits 2 and 4. A random unit excavated on the rim of Housepit 5 yielded little information, so a 1 x 2-m unit was excavated in the center of the depression.

Goal 2: to expose horizontally extensive portions of Housepit 6, Surface Depression E, and Surface Depression F, known to date from the terminal occupation of the site, and associated activity areas. Eighteen 2 x 2-m units forming a contiguous block were excavated in the vicinity of Housepit 6. The 15 units in Stratum 6 connect two of the random units and encompass nearly the entire house. The three additional units in Stratum D test outside the house boundary. Six 2 x 2-m units which connect the random units to form a block were selected for excavation in Surface Depression F. One of the units lies south of the boundary of Stratum 4 as originally drawn on the sampling stratum map. Twelve 2 x 2-m units and four 1 x 2-m units were placed within or on the rim of Surface Depression E, connecting four random units and forming a partial block across the center of the depression. An additional thirteen 2 x 2-m units were excavated in Stratum 4 between the rims of Surface Depressions E and F.

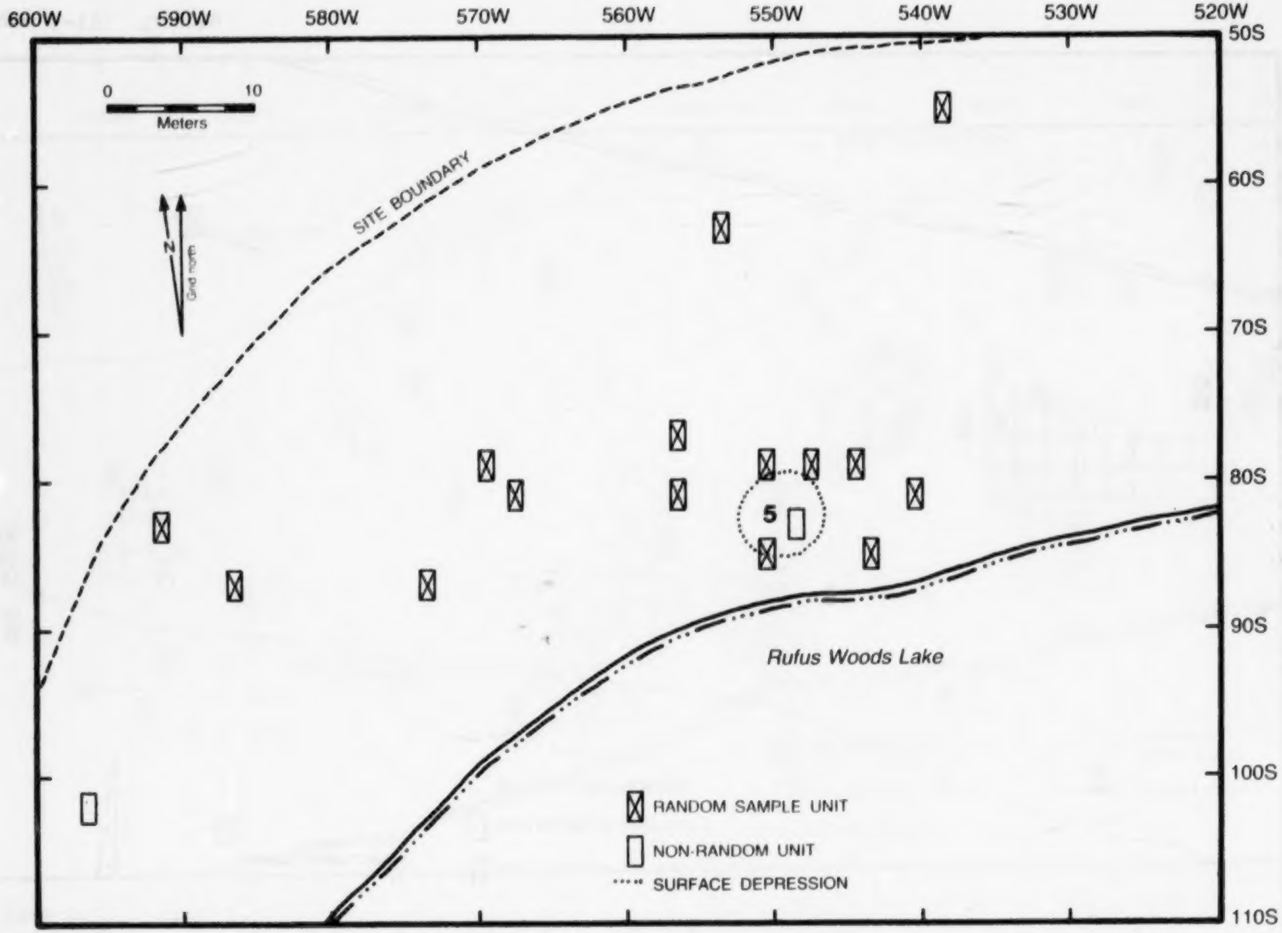

600W
590W
580W
570W
560W
550W
540W
530W
520W
50S
60S
70S
80S
90S
100S
110S
0
10
Meters
N
Grid north
SITE BOUNDARY
5
Rufus Woods Lake
RANDOM SAMPLE UNIT
NON-RANDOM UNIT
SURFACE DEPRESSION

Figure 1-12. Final excavation map, 45-OK-2. Datum points are located at 45-OK-2A, see Figure 1-15.

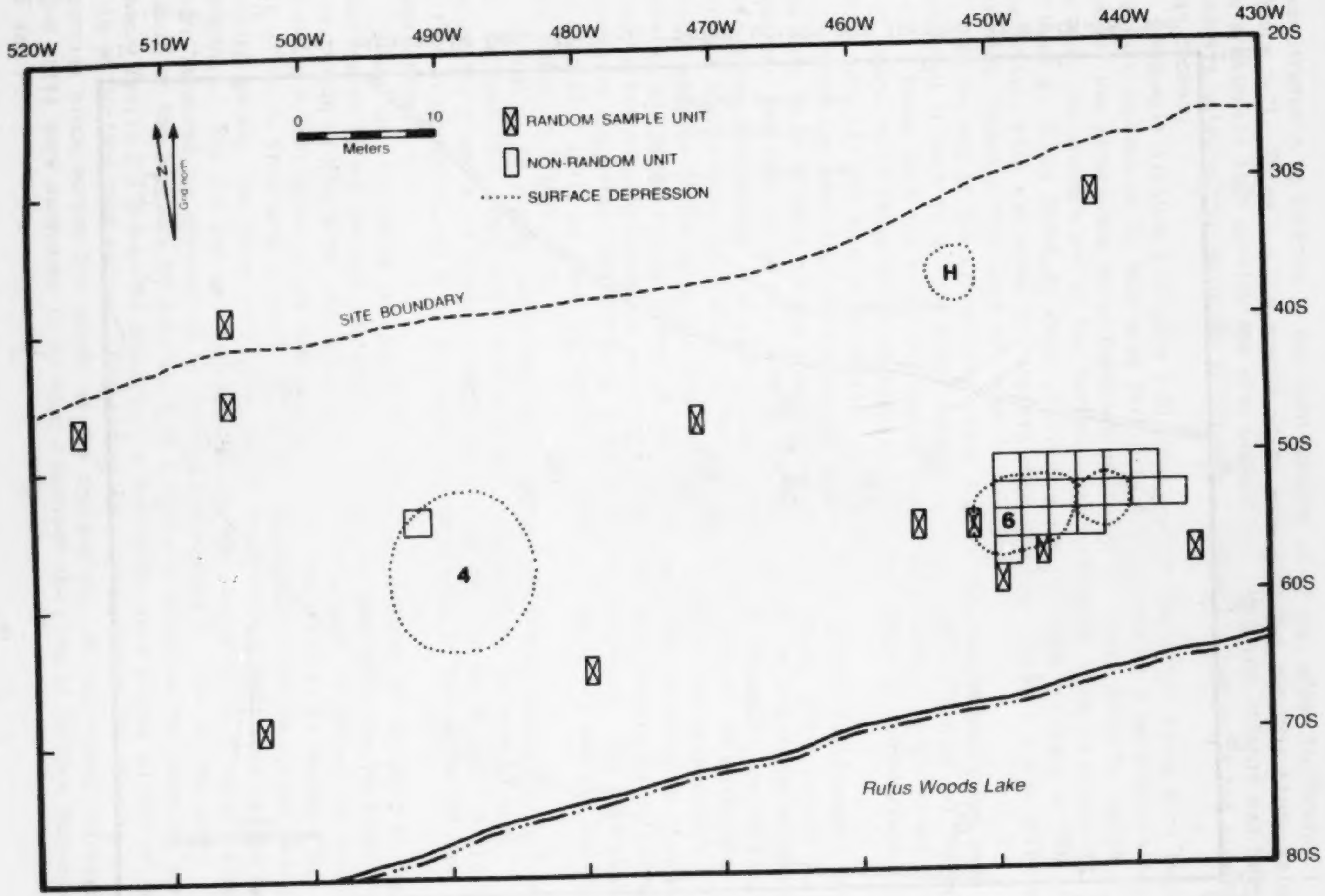

520W
510W
500W
490W
480W
470W
460W
450W
440W
430W
20S
30S
40S
50S
60S
70S
80S
N
Grid north
0
10
Meters
RANDOM SAMPLE UNIT
NON-RANDOM UNIT
SURFACE DEPRESSION
SITE BOUNDARY
H
6
4
Rufus Woods Lake

Figure 1-12. Cont'd.

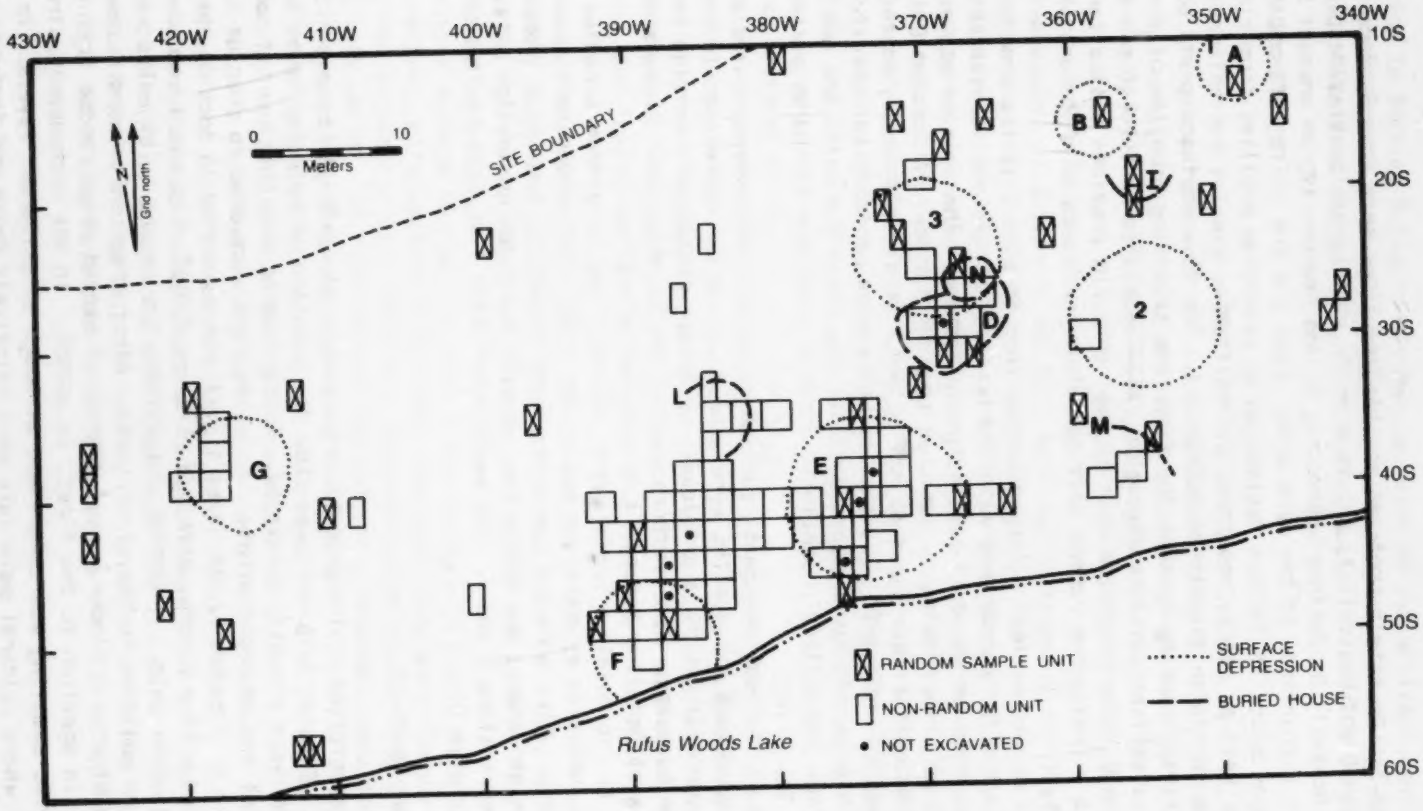

430W
420W
410W
400W
390W
380W
370W
360W
350W
340W
10S
20S
30S
40S
50S
60S
N
Grid north
0
10
Meters
SITE BOUNDARY
A
B
I
2
3
N
D
M
L
E
G
F
Rufus Woods Lake
RANDOM SAMPLE UNIT
NON-RANDOM UNIT
• NOT EXCAVATED
SURFACE DEPRESSION
BURIED HOUSE

Figure 1-12. Cont'd.

Goal 3: to obtain profiles and limited floor data from Surface Depression G and Housepit 3, and to clarify stratigraphic relationships between Housepit 3, Surface Depression D, and Feature 49, an unusual buried structure encountered in the same area. Four 2 x 2-m units were excavated in an L-shaped block in Surface Depression G, providing profiles from rim to center as well as nearly one-third of the floor. Six 2 x 2-m units were excavated in and on the rim of Housepit 3. The five southern units connect 5 random units, exposing some of the floor and providing profiles of the housepit itself and its stratigraphic relationship to Feature 49 and Surface Depression D. The purposive unit on the north rim provides a stratigraphic link with a contiguous random unit containing evidence of a yet another buried structure.

Goal 4: to collect a larger sample from Stratum D in the area between Strata 3 and 4 for comparison with the housepit strata and for evaluating the boundaries between housepit and nonhousepit areas. The area to be tested consisted of three previously untested 10 x 10 m blocks in Stratum D lying between Housepit Strata 3 and 4, and adjacent to two previously tested 10 x 10-m blocks in Stratum D. Two 1 x 2-m units were randomly selected from each of these blocks. Although randomly selected, these six units are not part of the original probabilistic sample of Stratum D and are listed as purposive units in Table 1-2.

Goal 5: to test the small surface depression discovered to the south of Housepit 2. Two 2 x 2-m units were placed across the depression in a diagonal pattern, connecting with a previously excavated random unit outside the depression boundary. The southern half of the southern unit is outside the boundaries of Sampling Stratum 4 as originally defined.

Goal 6: to obtain a profile and limited floor data from a buried structure indicated by walls in two of the additional random units excavated in Stratum D. Five more 2 x 2-m units were excavated, forming a transect across the structure, and connecting it with the block excavation between Surface Depressions E and F. The easternmost unit lies half in Stratum 4 and half in Stratum D.

Sampling at 45-OK-2A

Implementation of the probabilistic sample at 45-OK-2A is summarized in Table 1-2. Figures 1-13 and 1-14 show the location of selected units and those which were actually excavated. Probabilistic sampling was not completed in either of the housepit strata. No units were excavated in four of the 10 x 10-m blocks in Stratum 1. At least 1 unit was excavated in each of the remaining 10 x 10-m blocks, although in block 40N10E this was a second, rather than first level unit. In 50N10E and 40N30E, the second level units were excavated in addition to the first level. First stage units were excavated in all of the Stratum 2 blocks except 40N80E. A second stage random unit was excavated, in addition to the first, in 40N90E. In the nonhousepit strata, probabilistic sampling was completed, although at different levels. In Stratum A, where cultural materials were relatively dense and features were found, excavation proceeded through first and second stage units, while excavation in Stratum B was terminated--because of low artifact densities--after completion of the first stage units. No purposive sampling was done at 45-OK-2A. The final disposition of excavated units is shown in Figure 1-15.

EXCAVATION METHODS

Excavation units were either 1 x 2-m units or 2 x 2-m squares, subdivided into 1 x 1-m quads. The unit as a whole is designated by the northwest corner, but excavated materials were kept separate by quads. Vertical control was provided by 10-cm arbitrary levels, measured from the surface of the northwest corner of the 1 x 2-m or 2 x 2-m unit. Where greater control was desired, 5-cm levels were used.

Arrangements of artifacts and soil matrices contrasting distinctively with the surrounding matrix were designated as features. While feature designations were most commonly applied to cultural deposits, they were also used to separate different natural matrices occurring within the same arbitrary level. When excavators encountered a distinct matrix, whether geological or cultural, it was given a feature number and feature level materials were collected separately from unit level materials. Plan views were drawn and, if the thickness and complexity warranted, the feature was bisected and profiled. Geological features were handled in the same way as cultural features up to the analytic stage.

Units were excavated by skimming with flat shovels, or by trowels when concentrations of artifacts, matrix staining, or features were encountered. The matrix was screened through 1/8-in mesh screens. Hand-held, two-legged dry screens were most commonly used, but materials from some areas was water screened, and frozen matrix was taken to the laboratory for thawing before being screened there.

All cultural materials were taken into the project's field laboratory except FMR, which was classified in the field by material type, counted and weighed by type, recorded in two places, and discarded. Unmodified rock was not counted or weighed.

Winter excavation required only a few changes in field practices. During the relatively mild weather of November, December, and early January, standard excavation procedures were employed. Excavations at 45-OK-2A were completed during this period. In late January and February, however, snowstorms and colder temperatures made record keeping more difficult, slowed down work and necessitated special field techniques. Planned random units which had been previously insulated with woodchips were excavated normally, but the soil of purposive units selected during late January and February had to be thawed with large fires built on metal sheets. Heavy rains preceding the cold weather had saturated the sediments; when the temperature dropped below 20° F, it was difficult to screen the matrix because it froze before passing through the mesh. When this happened, the matrix was brought to the lab for screening. No biases have been noted in the data that can be attributed to winter excavation.

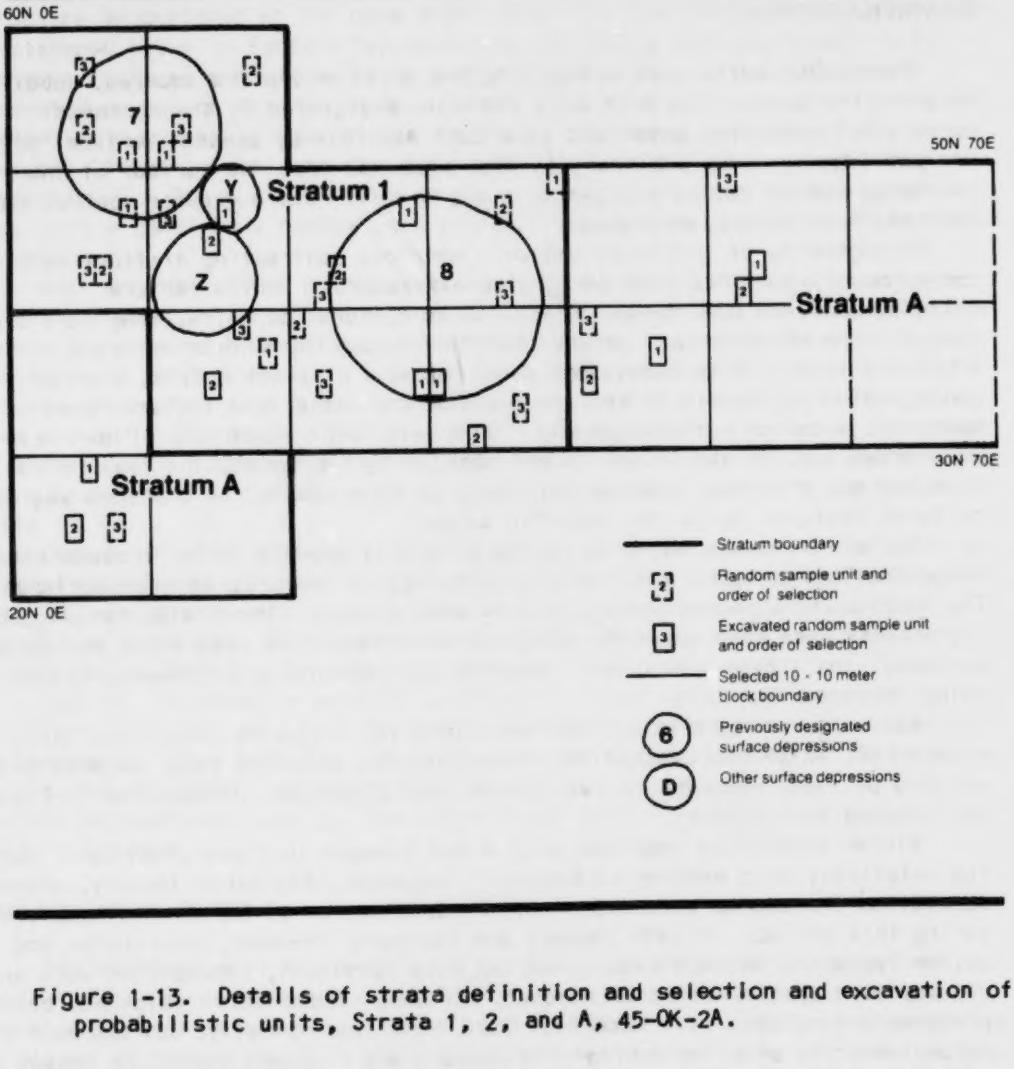

60N 0E
50N 70E
7
Y
Stratum 1
Z
8
Stratum A
30N 70E
Stratum A
20N 0E
Stratum boundary
Random sample unit and order of selection
Excavated random sample unit and order of selection
Selected 10 - 10 meter block boundary
6
Previously designated surface depressions
D
Other surface depressions

Figure 1-13. Details of strata definition and selection and excavation of probabilistic units, Strata 1, 2, and A, 45-OK-2A.

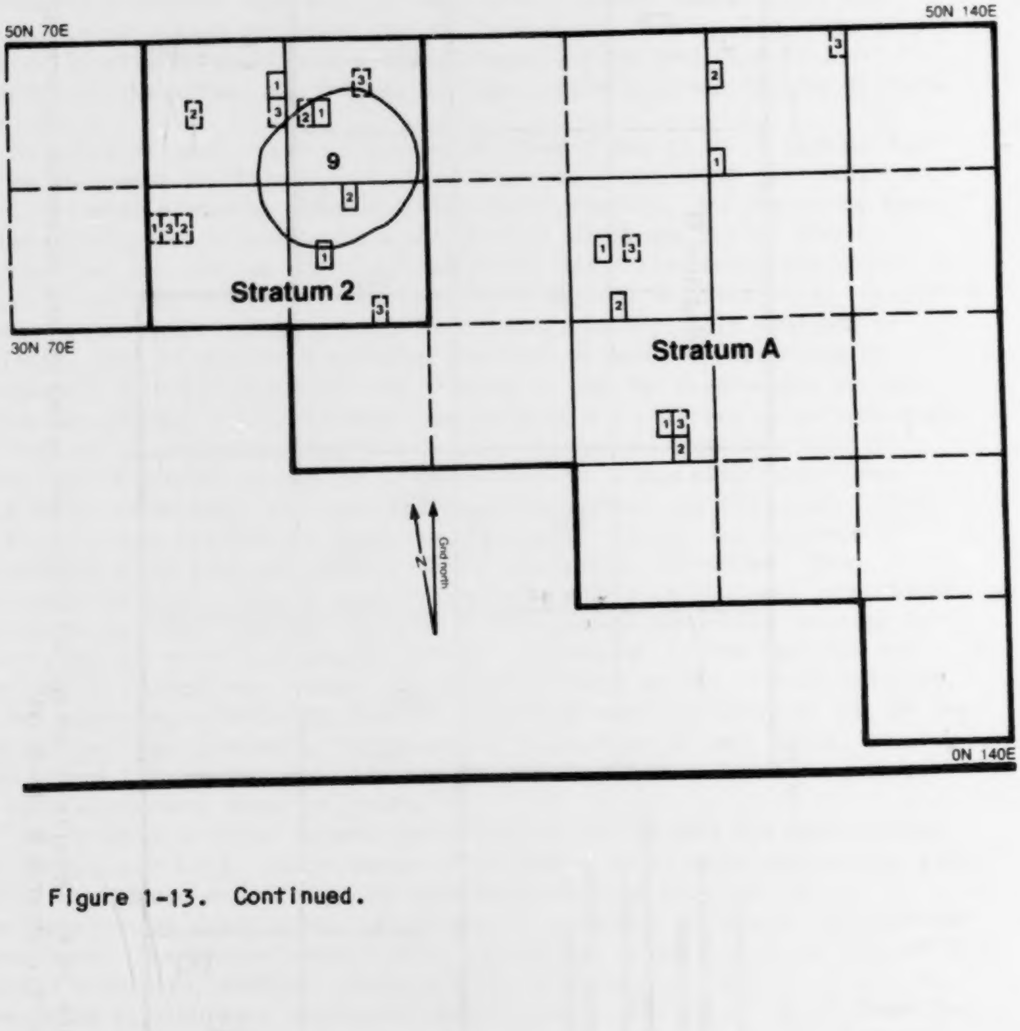

50N 70E
50N 140E
30N 70E
0N 140E
Stratum 2
Stratum A
9
1
2
3
Grid north
N

Figure 1-13. Continued.

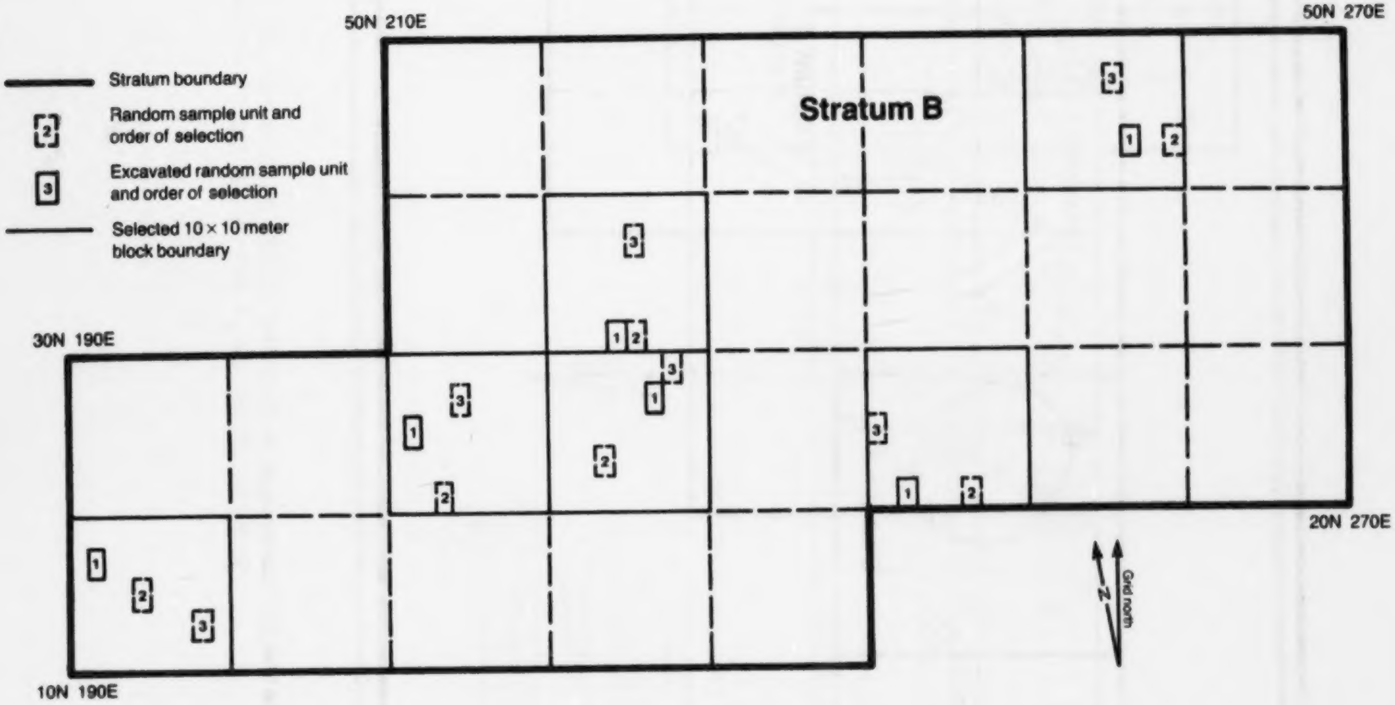

Stratum boundary
2 Random sample unit and order of selection
3 Excavated random sample unit and order of selection
Selected 10 × 10 meter block boundary
50N 210E
50N 270E
30N 190E
10N 190E
20N 270E
Stratum B
1
2
3
Grid north
N

Figure 1-14. Details of strata definition and selection and excavation of probabilistic units, Stratum B, 45-OK-2A.

For additional information on field and lab techniques see Jermann and Whittlesey (1978), Jermann et al. (1980) and Campbell (1984d).

ORGANIZATION OF ANALYSES AND REPORT FORMAT

The following chapters present the results of investigations at 45-OK-2 and 45-OK-2A. The same research procedures were applied to each site, so they are readily discussed together. In addition, a common depositional and cultural sequence was developed for the two sites. Chapter Two, Natural and Cultural Stratigraphy, discusses the geologic setting and depositional histories of the sites, and defines vertical analytic zones for the cultural materials.

Evidence of past human activities at 45-OK-2 and 45-OK-2A include such diverse phenomena as stained soil, buried pit outlines, wood charcoal, burnt seeds, skeletal elements, manufacturing waste products, and completed tools. All have attributes of either form or location which are due to human intervention, and are our empirical basis for describing human activities in the past. Various independent analyses were applied to these data. Chapter 3 presents results of technological, functional, and stylistic analyses of artifacts, that is objects displaying physical evidence of human use or manufacture, particularly tools and ornaments, and the by-products of their manufacture or use. Certain unmodified lithics are included as well because they may be raw material sources. The assemblage of identified bone is summarized in Chapter 4, and the implications for procurement practices, preparation techniques, and seasonality of occupation are discussed. The identified plant remains are described in Chapter 5, and the evidence of subsistence activities and seasonality of occupation discussed. The description of plant remains modified by manufacture is included here rather than in the artifact chapter, because of the special expertise involved in identifying the artificial modifications. In Chapter 6, the features are described by categories. House floors are included as one feature category, but not described in detail. Chapter 7 provides detailed descriptions of the construction, age, contents, and season of occupation of each house, drawing on pertinent information from all of the above analyses. Overall syntheses and conclusions are found in Chapter 8.

The 45-OK-2 artifact assemblage is one of the largest and most diverse from any project site. Large sample sizes enable us to draw conclusions with greater confidence and to examine some types of data too rare for interpretation at other sites. 45-OK-2A, in contrast, is one of the smallest assemblages. The largest zonal lithic assemblage is only half the size of the smallest from Site 45-OK-2. Interpretation of data from 45-OK-2A is, in most cases, made difficult by inadequate sample sizes. The reporting of these two sites together creates some awkwardness in format. The basic data categories are reported in parallel fashion but the 45-OK-2 data merits more detailed discussion and special data tabulations and analyses from which 45-OK-2A is excluded.

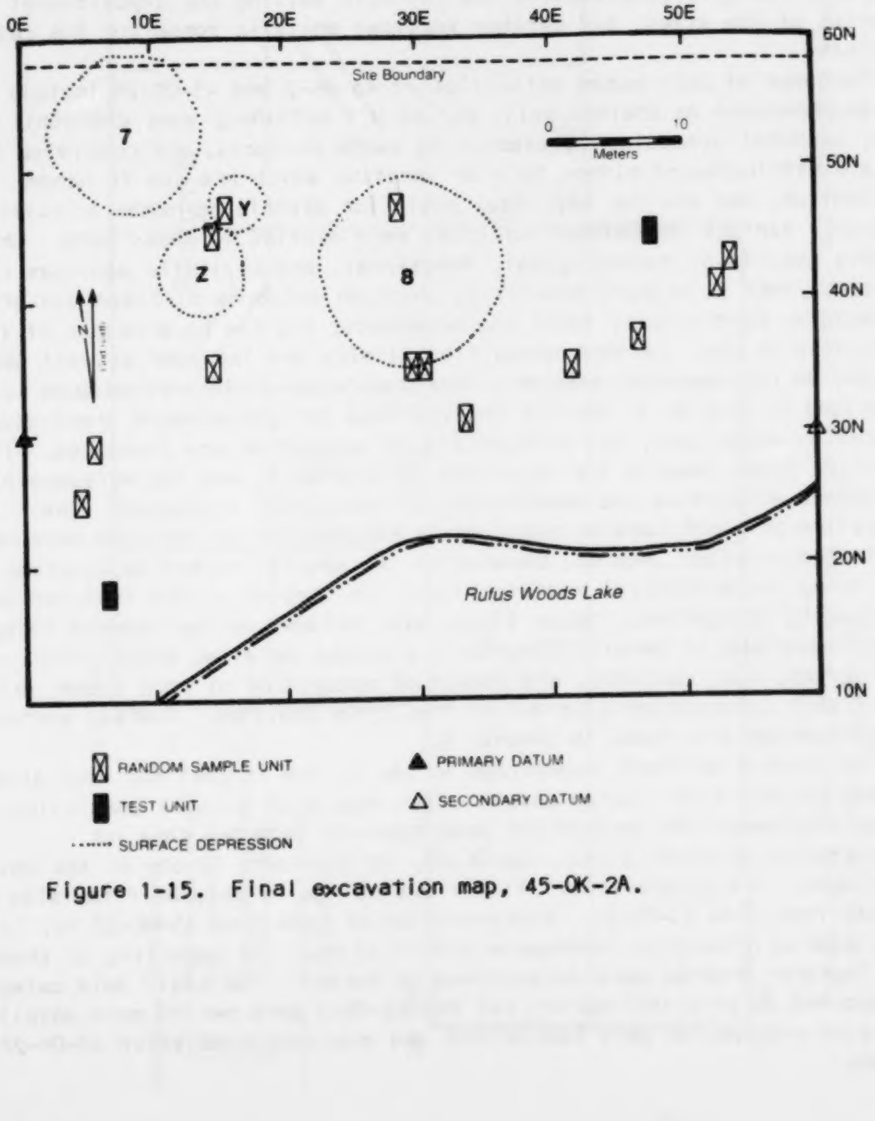

0E
10E
20E
30E
40E
50E
60N
50N
40N
30N
20N
10N
Site Boundary
7
Y
Z
8
0
10
Meters
N
Rufus Woods Lake
RANDOM SAMPLE UNIT
TEST UNIT
SURFACE DEPRESSION
PRIMARY DATUM
SECONDARY DATUM

Figure 1-15. Final excavation map, 45-OK-2A.

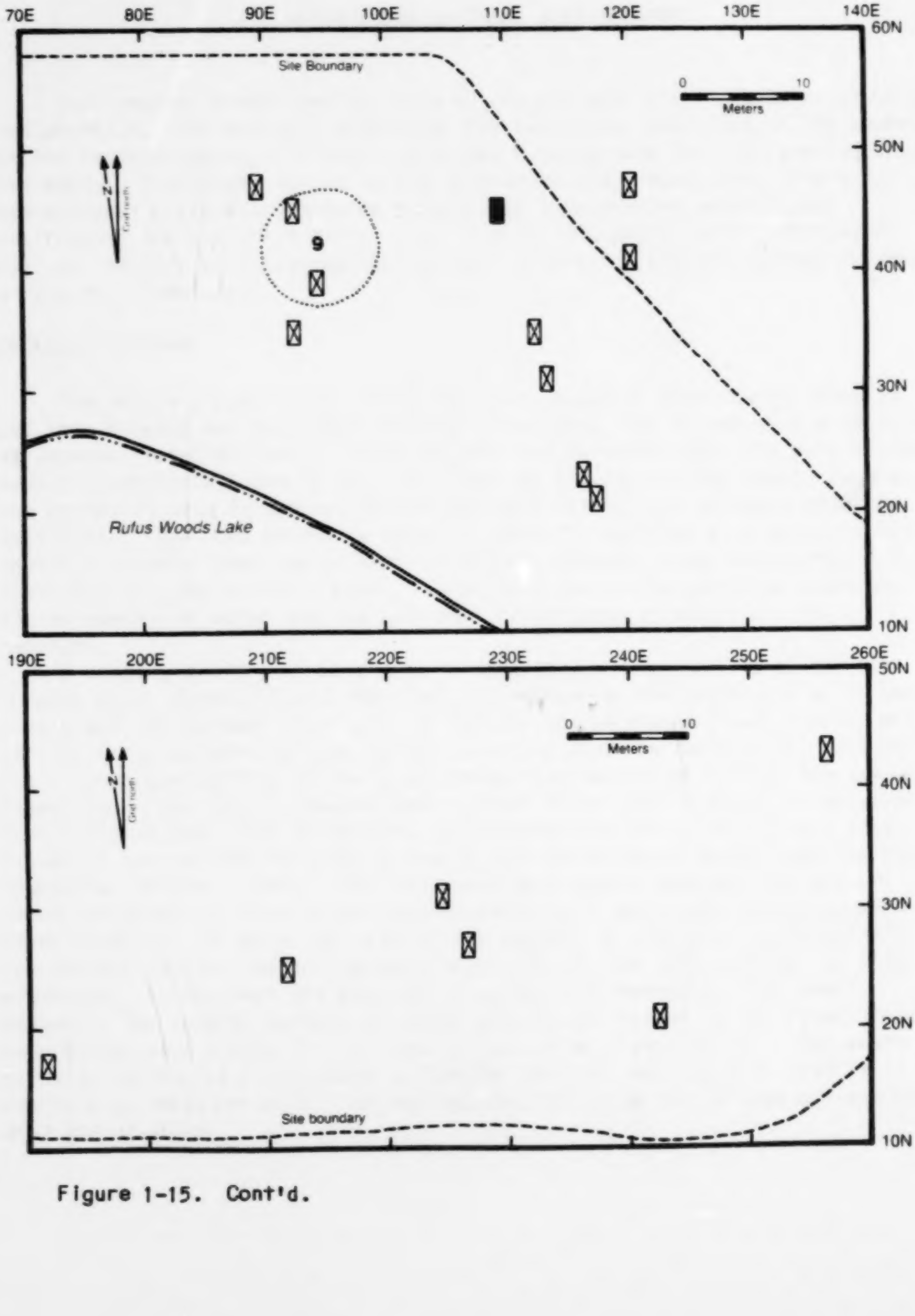

70E
80E
90E
100E
110E
120E
130E
140E
60N
50N
40N
30N
20N
10N
Site Boundary
0
10
Meters
N
Grid north
9
Rufus Woods Lake
190E
200E
210E
220E
230E
240E
250E
260E
50N
40N
30N
20N
10N
0
10
Meters
N
Grid north
Site boundary

Figure 1-15. Cont'd.

2. NATURAL AND CULTURAL STRATIGRAPHY

This chapter summarizes the natural and cultural stratigraphy of 45-OK-2 and 45-OK-2A. The geologic setting of the two sites, described in the context of the regional geologic history, provides a background for interpreting their sediments. The strata mapped during excavation are grouped into site-wide depositional units which provide a basis for interpreting depositional environment and for correlating cultural materials among units. The second half of the chapter discusses the cultural strata, or analytic zones, defined within this framework.

GEOLOGIC SETTING

The entire project area lies within the Columbia River canyon which is cut into Miocene and Cretaceous bedrock formations, and filled with a variety of unconsolidated sediments of Pleistocene and Holocene age. The bulk of the deposits are Pleistocene in age, laid down by glacial-related events such as ice movement, lake formation, and canyon downcutting, all of which affected vast areas. The less extensive Holocene deposits resulted from depositional agents with more localized effects: tributary streams, wind, downslope movement, and the Columbia River. Throughout the Pleistocene and Holocene, the movements of water and ice have been constrained by older bedrock deposits.

A complex history of landforms is apparent in the vicinity of the site (Figure 2-1). Bissell Flat, the 1,000 ft terrace on the eastern side of the river, and the remnant of a 1,200 ft terrace in the Hudnut Creek canyon, are part of the prominent terrace system resulting from the Columbia's rapid post-Pleistocene downcutting of the glaciolacustrine sediments filling the canyon. Elsewhere in the canyon, Mazama tephra Layer O has been observed in alluvial fans built on the 1,000 ft terrace, indicating that the river reached this elevation before 7000 B.P., and probably reached historic elevations shortly thereafter (Hibbert 1984). The lower--and presumably younger--terrace on which the sites lie also is cut into Nespelem silt and capped with Columbia River gravels. It abuts the crystalline bedrock of the Colville Batholith, the contact marking the northernmost migration of the river channel at this elevation. To the east and west are alluvial fans emanating from small canyons. The lateral margins of these fans do not extend to the river; they have either been eroded by the river or buried by river gravels. The western alluvial fan may be Pleistocene in age, as the plan map suggests that it is overlain by Nespelem silt. Two springs are indicated in the area between 45-OK-2 and 45-OK-2A.

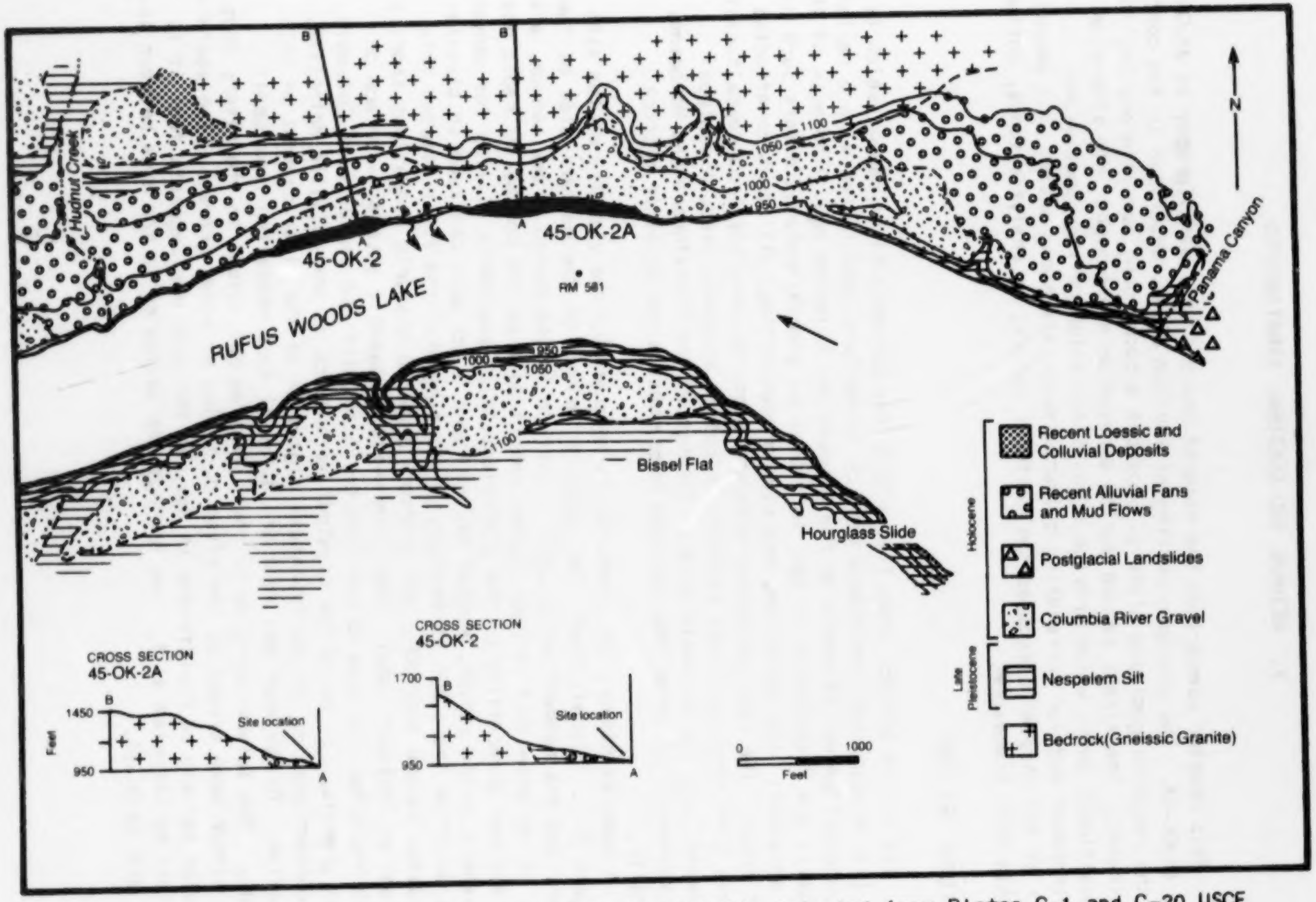

N
RUFUS WOODS LAKE
45-OK-2
45-OK-2A
RM 581
Hudnut Creek
Panama Canyon
Bissel Flat
Hourglass Slide
A
B
A
B
1100
1050
1000
950
950
1000
1050
1100
Holocene
Recent Loessic and Colluvial Deposits
Recent Alluvial Fans and Mud Flows
Postglacial Landslides
Columbia River Gravel
Late Pleistocene
Nespelem Silt
Bedrock(Gneissic Granite)
0
1000
Feet
CROSS SECTION 45-OK-2A
1450
950
Feet
B
A
Site location
CROSS SECTION 45-OK-2
1700
950
B
A
Site location

Figure 2-1. Geologic map of 45-OK-2 and 45-OK-2A vicinity (adapted from Plates C-1 and C-20 USCE Reservoir Geology).

The deposits containing cultural materials at the two sites are recent river and aeolian deposits which are mapped as Columbia River gravel on the regional scale map. That the upper surface of the bar was recently part of the active floodplain is indicated by the site topography. Evident on the topographic map (Figure 1-3) is a long linear depression which is a partially filled old channel, and a slight rise, or levee, between the depression and the current river channel.

PROCEDURES

The stratigraphic mapping crew profiled units at 45-OK-2 and 45-OK-2A as excavation progressed. At least one wall was profiled in each unit at both sites, and all four walls were profiled in units with complex strata or dense cultural materials. Column samples were taken at 18 locations at 45-OK-2 (Figure 2-2) and of these, 14 were analyzed. At 45-OK-2A, seven column samples were taken (Figure 2-3), of which three were analyzed. The column sample analysis results are given in Appendix A. Methods and procedures used in stratigraphic profiling, column sampling, and sediment analysis are described in more detail in the project's research design (Campbell 1984d).

Field stratigraphic descriptions were used to define major depositional units that could be traced among excavation units. At 45-OK-2, analysis of the depositional history was done in two stages. A series of transects was used to correlate strata among isolated units and between large blocks (Figure 2-2). The profiles from the block excavation were pasted together so that stratigraphic relationships could be directly traced from one section of the block to another. At 45-OK-2A, where there are a few contiguous units, but no major blocks, correlation of strata was accomplished with transects (Figure 2-3). Physical descriptions are given for each depositional unit; sediment sources, transport mechanisms, environment of deposition, and post-depositional alteration are discussed where applicable. The results of microscopic examinations, and physical and chemical analyses are referred to where pertinent. Most of the column samples, however, were collected in units containing housepits and have limited utility in interpreting the natural sediment history.

DEPOSITIONAL HISTORY

Located a short distance apart on the same terrace, sites 45-OK-2 and 45-OK-2A share a similar depositional environment. Profiling was done independently at the two sites and no stratigraphic correlations were made in the field. During analysis, however, physically similar deposits at the two sites were given the same designation (Tables 2-1 and 2-2). Although these must share a similar depositional origin, they are not necessarily equivalent in age. The descriptions below address both sites; important differences are noted. Stratigraphic transects of 45-OK-2 (Figures 2-4 through 2-6) and 45-OK-2A (Figures 2-7 through 2-9) illustrate the discussion.

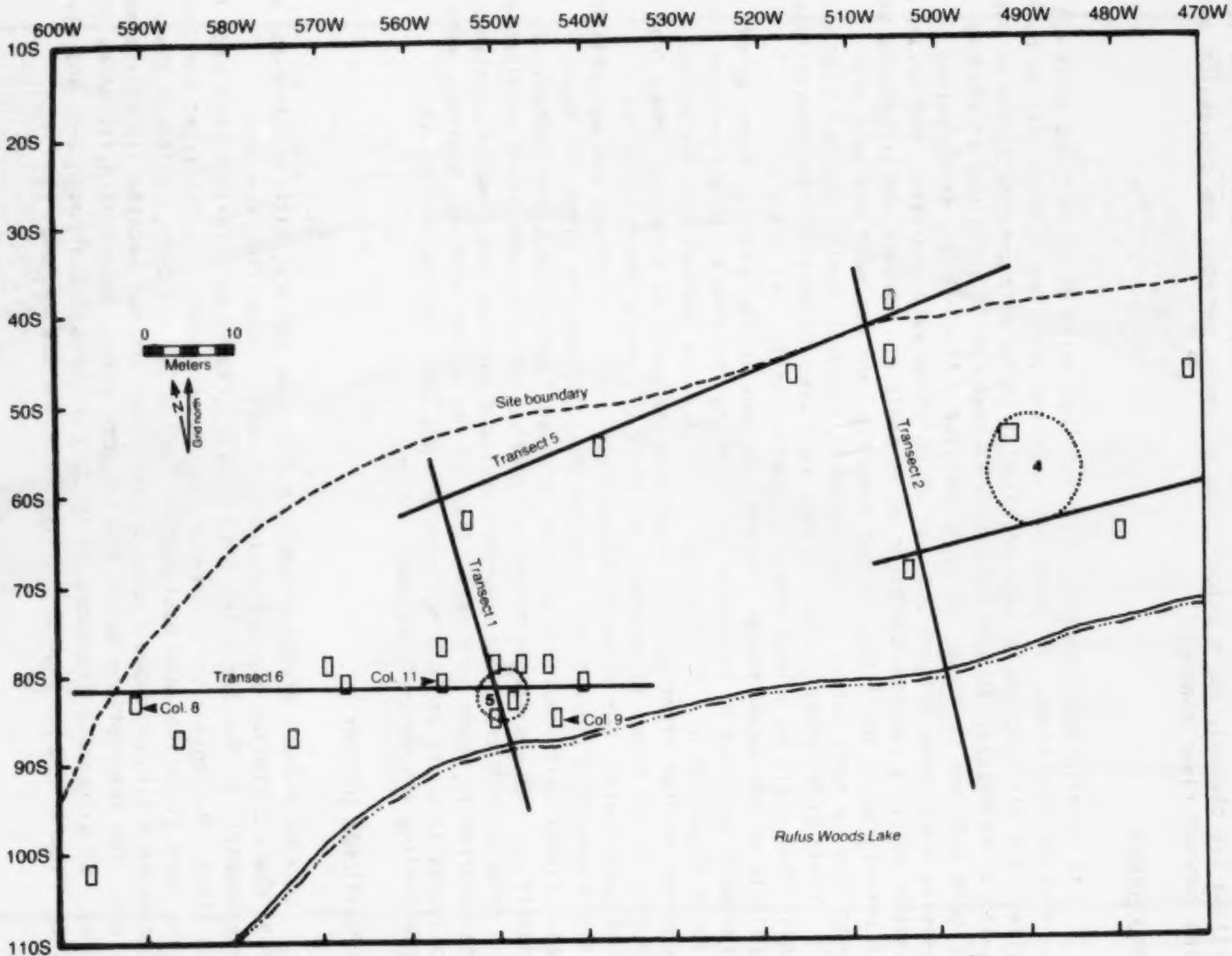

600W
590W
580W
570W
560W
550W
540W
530W
520W
510W
500W
490W
480W
470W
10S
20S
30S
40S
50S
60S
70S
80S
90S
100S
110S
0
10
Meters
N
Grid north
Site boundary
Transect 5
Transect 2
Transect 1
Transect 6
Col. 11
Col. 8
Col. 9
5
4
Rufus Woods Lake

Figure 2-2. Location of profiles, column samples, and transects, 45-OK-2.

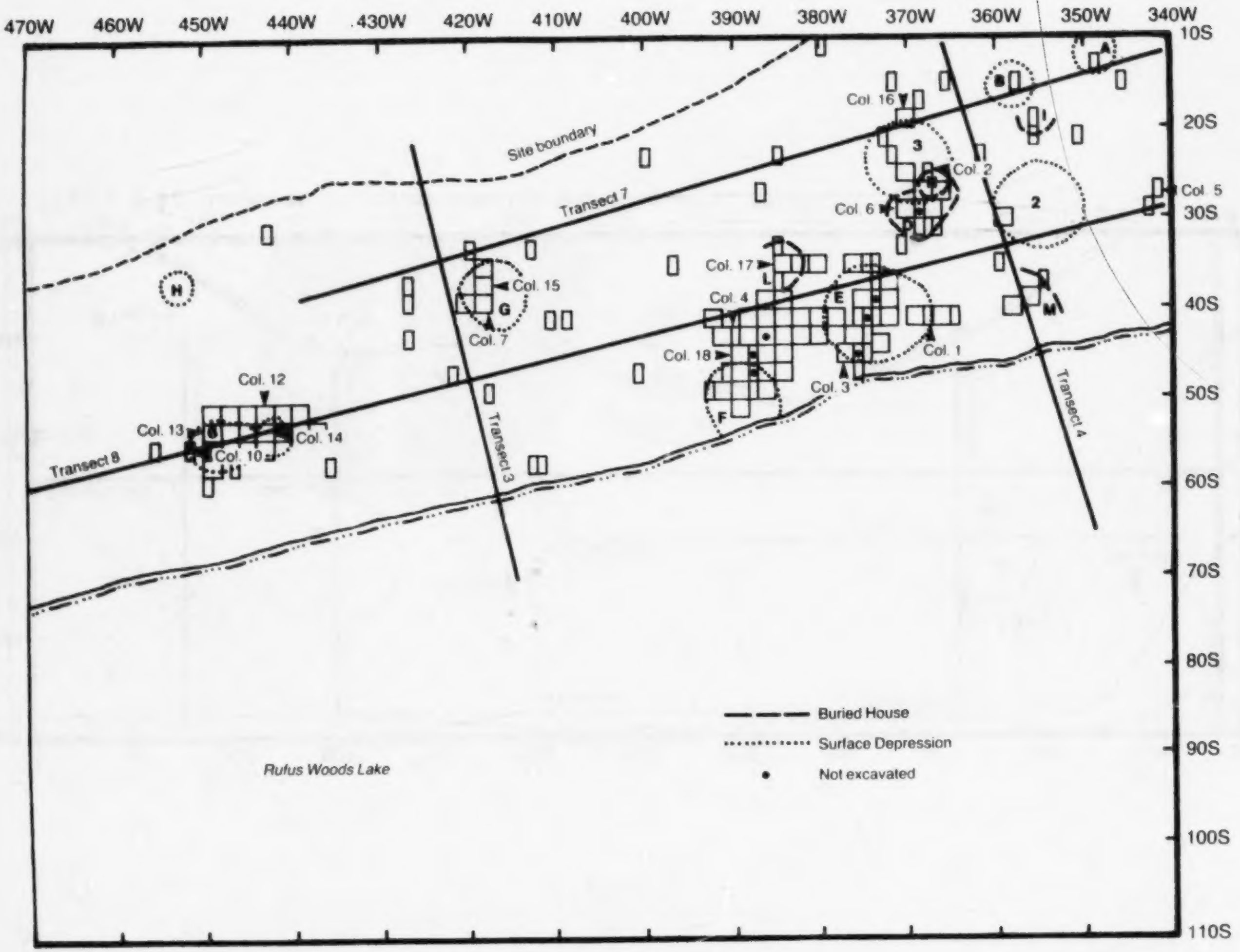

470W
460W
450W
440W
430W
420W
410W
400W
390W
380W
370W
360W
350W
340W
10S
20S
30S
40S
50S
60S
70S
80S
90S
100S
110S
Site boundary
Transect 7
Transect 8
Transect 3
Transect 4
Col. 1
Col. 2
Col. 3
Col. 4
Col. 5
Col. 6
Col. 7
Col. 10
Col. 12
Col. 13
Col. 14
Col. 15
Col. 16
Col. 17
Col. 18
A
B
E
F
G
H
L
M
2
3
Buried House
Surface Depression
Not excavated
Rufus Woods Lake

Figure 2-2. Cont'd.

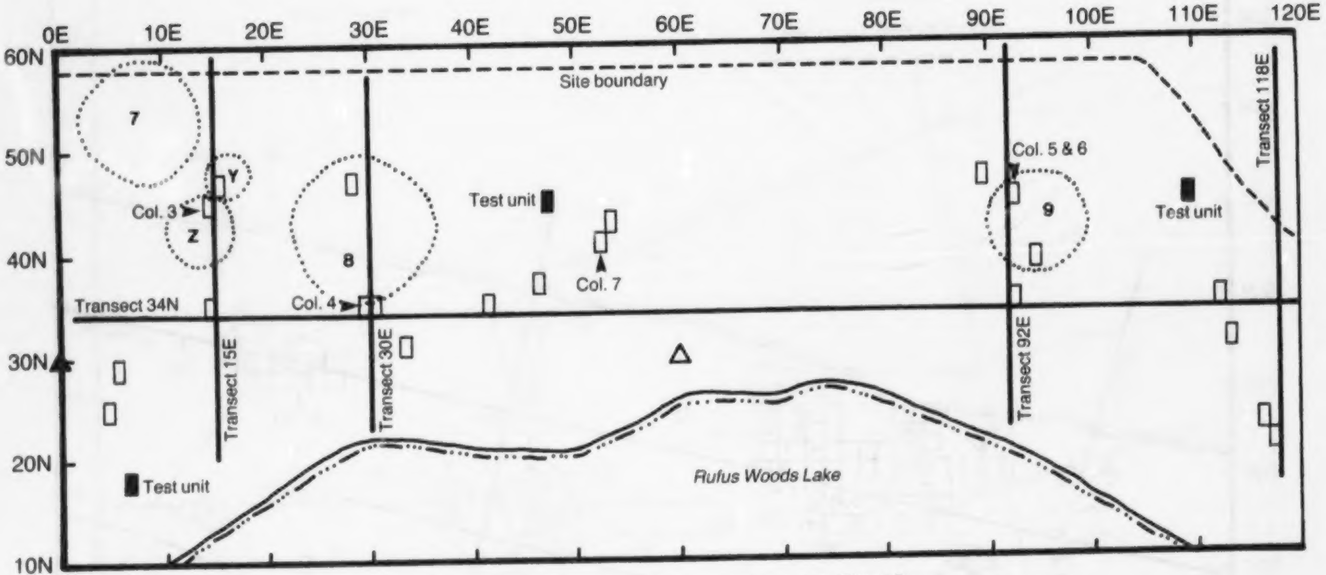

0E
10E
20E
30E
40E
50E
60E
70E
80E
90E
100E
110E
120E
60N
50N
40N
30N
20N
10N
Site boundary
7
Y
Z
8
9
Col. 3
Col. 4
Col. 5 & 6
Col. 7
Test unit
Test unit
Test unit
Transect 34N
Transect 15E
Transect 30E
Transect 92E
Transect 118E
Rufus Woods Lake

Figure 2-3. Location of column samples and transects, 45-OK-2A.

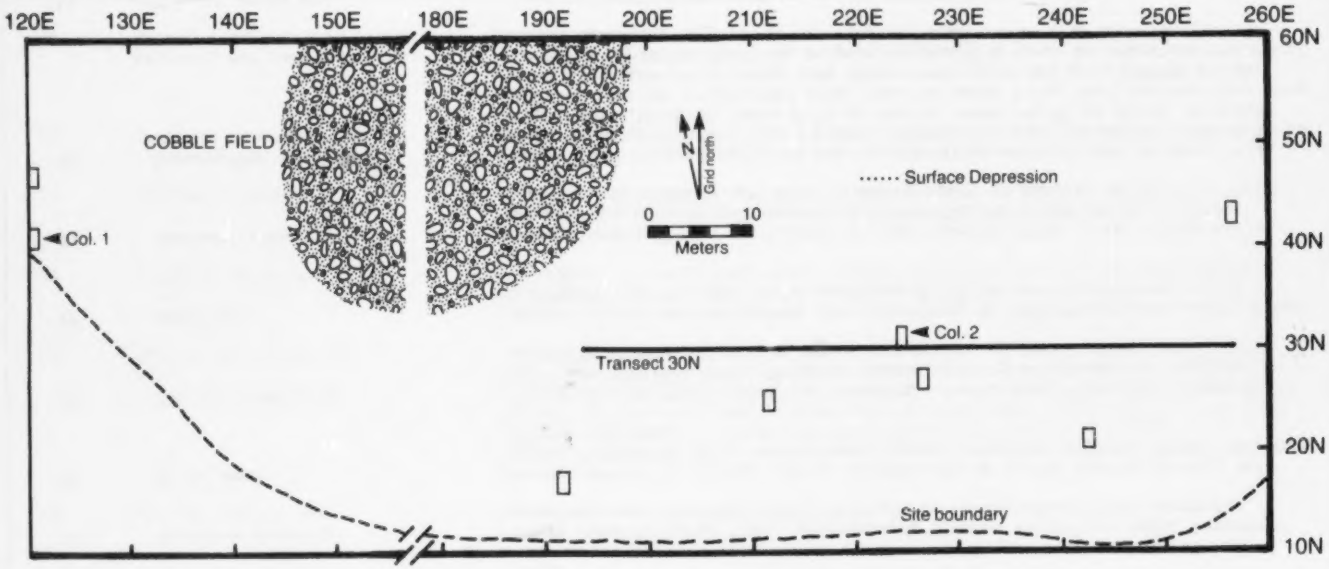

120E
130E
140E
150E
180E
190E
200E
210E
220E
230E
240E
250E
260E
60N
50N
40N
30N
20N
10N
COBBLE FIELD
Col. 1
N
Grid north
0
10
Meters
...... Surface Depression
Col. 2
Transect 30N
Site boundary

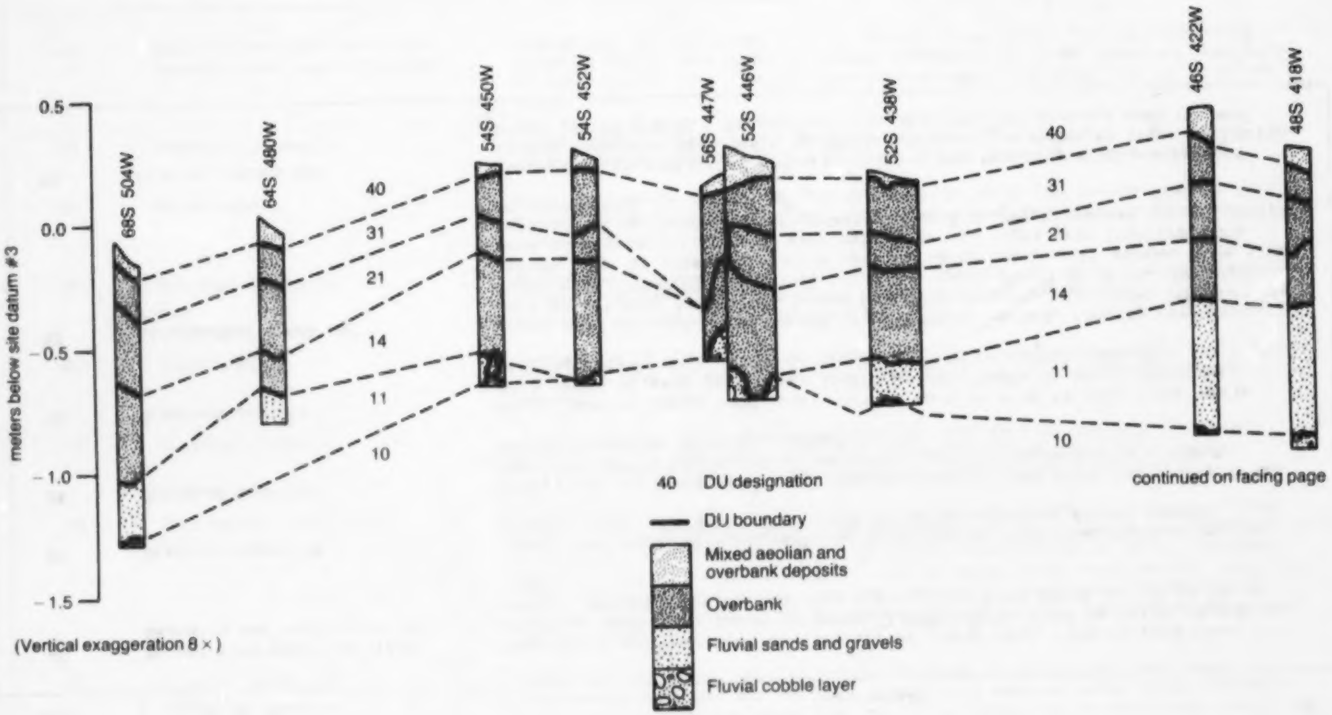
Figure 2-3. Cont'd.

Table 2-1. Summary of depositional units, 45-OK-2.

Depositional Unit	Type of Deposit	Description
40	Recent wind-modified flood deposits and vegetation mat	Vegetation mat developed on well sorted loamy sand, fine to very fine, slightly hard, dark brown to brown (10YR3/3-5/3), 5-10 cm thick, boundary abrupt, smooth. May include fine laminations 1 mm thick and up to 50 cm long.
31	Overbank deposits	Loamy sand to sandy loam, well sorted, fine to very fine, soft, brown to greyish brown (10YR5/3-5/2), 10-20 cm thick, boundary clear, smooth.
32	Slope wash	Sand, medium to coarse, poorly sorted with up to 10% medium gravel, pale brown (10YR6/3), soft, one or more strata totalling 5-30 cm thick, boundary clear, smooth.
21	Overbank deposits	Sandy loam to loamy sand, well sorted, fine to very fine, soft, pale brown to brown (10YR6/3-5/3), 15-25 cm thick, bedding occasionally visible, boundary gradual to clear, smooth.
22	Slope wash	Sand, fine to coarse, poorly sorted with up to 10% fine gravel, soft, brown (10YR5/3), one or more beds totalling 20-50 cm thick, boundary clear, smooth.
14	Overbank deposits	Sandy loam to loamy sand, well sorted, sand is fine to very fine, soft, pale brown to very pale brown (10YR6/3-7/3), 15-25 cm thick, internal bedding occasionally visible, boundary clear to abrupt, smooth.
12	Interbedded sands and silt	Loamy sand to sand, well sorted to moderately sorted, fine to very fine, soft to slightly hard, pale brown (10YR6/3) to very pale brown (10YR7/3) to light grey (10YR7/2), beds 5-15 cm thick, total 30-50 cm thick, boundary abrupt. May be interbedded with loam to sandy loam, well sorted, very fine sand to coarse silt, hard, very pale brown to light grey (10YR7/3-7/2), lenses 5-10 cm thick, 5 cm to greater than 2 m long, boundary abrupt, wavy to irregular.
11	Fluvial sands and gravels	Sand to loamy sand, sand is coarse to fine, texture fines upwards, moderately well sorted, salt and pepper to brown and pale brown (10YR5/3-6/3), some magnetite, some iron staining, loose, one or more beds totalling 15-30 cm, boundary clear, irregular.
10	Fluvial cobble bar	Subangular to subrounded gravels, cobbles, and boulders with a matrix of medium to coarse sand, well to poorly sorted, pale brown to light yellowish brown (10YR6/3-6/4).

Table 2-2. Summary of depositional units, 45-OK-2A.

Depositional Unit	Type of Deposit	Description
40	Recent wind-modified flood deposits and vegetation mat	Vegetation mat developed on well sorted loamy sand, fine to very fine, slightly hard, dark brown to brown (10YR3/3-5/3), 5-10 cm thick, boundary abrupt, smooth. May include fine laminations 1 mm thick and up to 50 cm long.
31	Overbank deposits	Loamy sand to sandy loam, well sorted, fine to very fine, soft, brown to grayish brown (10YR5/3-5/2), 10-20 cm thick, boundary clear, smooth.
21	Overbank deposits	Sandy loam to loamy sand, well sorted, fine to very fine, soft, pale brown to brown (10YR6/3-5/3), 15-25 cm thick, bedding occasionally visible, boundary gradual to clear, smooth.
14	Overbank deposits	Sandy loam to loamy sand, well sorted, sand is fine to very fine, soft, pale brown to very pale brown (10YR6/3-7/3), 15-25 cm thick, internal bedding occasionally visible, boundary clear to abrupt, smooth.
12	Interbedded sands and silts	Loamy sand to sand, well sorted to moderately sorted, fine to very fine, soft to slightly hard, pale brown (10YR6/3) to very pale brown (10YR7/3) to light grey (10YR7/2), beds 5-15 cm thick, total 30-50 cm thick, boundary abrupt. May be interbedded with loam to sandy loam, well sorted, very fine sand to coarse silt, hard, very pale brown to light gray (10YR7/3-7/2), lenses 5-10 cm thick, 5 cm to greater than 2 m long, boundary abrupt, wavy to irregular.
10	Fluvial cobble bar	Subangular to subrounded gravels, cobbles and boulders with a matrix of medium to coarse sand, well to poorly sorted, pale brown to light yellowish brown (10YR6/3-6/4). Stratified with alluvial fan gravels east of 140E.


0.5
0.0
-0.5
-1.0
-1.5
meters below site datum #3
(Vertical exaggeration 8 ×)
68S 504W
64S 480W
54S 450W
54S 452W
56S 447W
52S 446W
52S 438W
46S 422W
48S 418W
40
31
21
14
11
10
40 DU designation
DU boundary
Mixed aeolian and overbank deposits
Overbank
Fluvial sands and gravels
Fluvial cobble layer

continued on facing page

Figure 2-4. East-west stratigraphic cross section of 45-OK-2, Sheet #1. For description of depositional units, see Table 2-1.

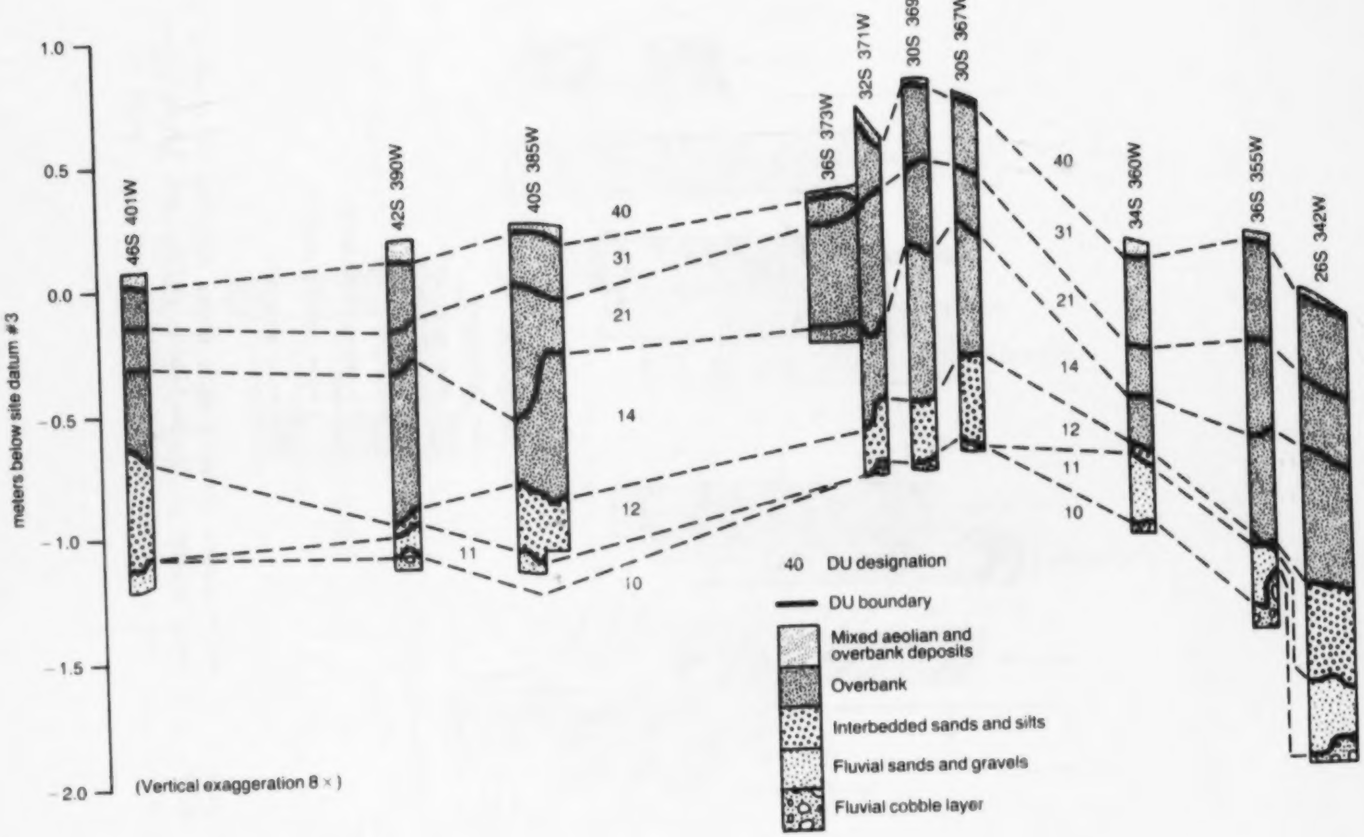

1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
meters below site datum #3
(Vertical exaggeration 8 ×)
46S 401W
42S 390W
40S 385W
36S 373W
32S 371W
30S 369W
30S 367W
34S 360W
36S 355W
26S 342W
40
31
21
14
12
11
10
40 DU designation
DU boundary
Mixed aeolian and overbank deposits
Overbank
Interbedded sands and silts
Fluvial sands and gravels
Fluvial cobble layer

Figure 2-4. Cont'd.

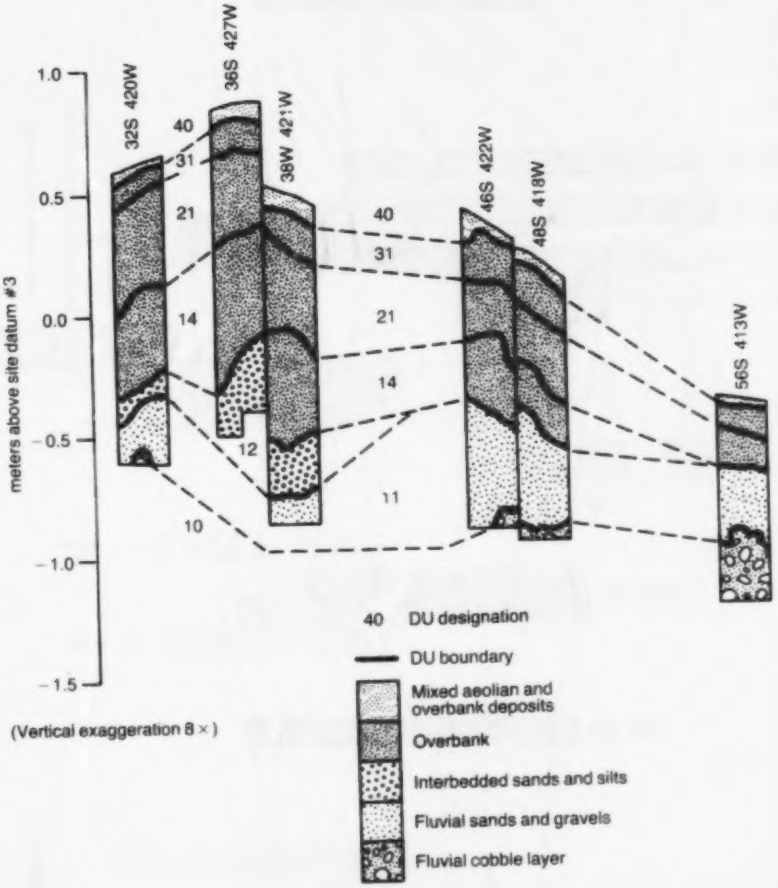

1.0
0.5
0.0
-0.5
-1.0
-1.5
meters above site datum #3
(Vertical exaggeration 8 ×)
32S 420W
36S 427W
38W 421W
46S 422W
48S 418W
56S 413W
40
31
21
14
12
10
40
31
21
14
11
40 DU designation
DU boundary
Mixed aeolian and overbank deposits
Overbank
Interbedded sands and silts
Fluvial sands and gravels
Fluvial cobble layer

Figure 2-5. North-south stratigrapic cross section of 45-OK-2 at 427W. For description of depositional units, see Table 2-1.

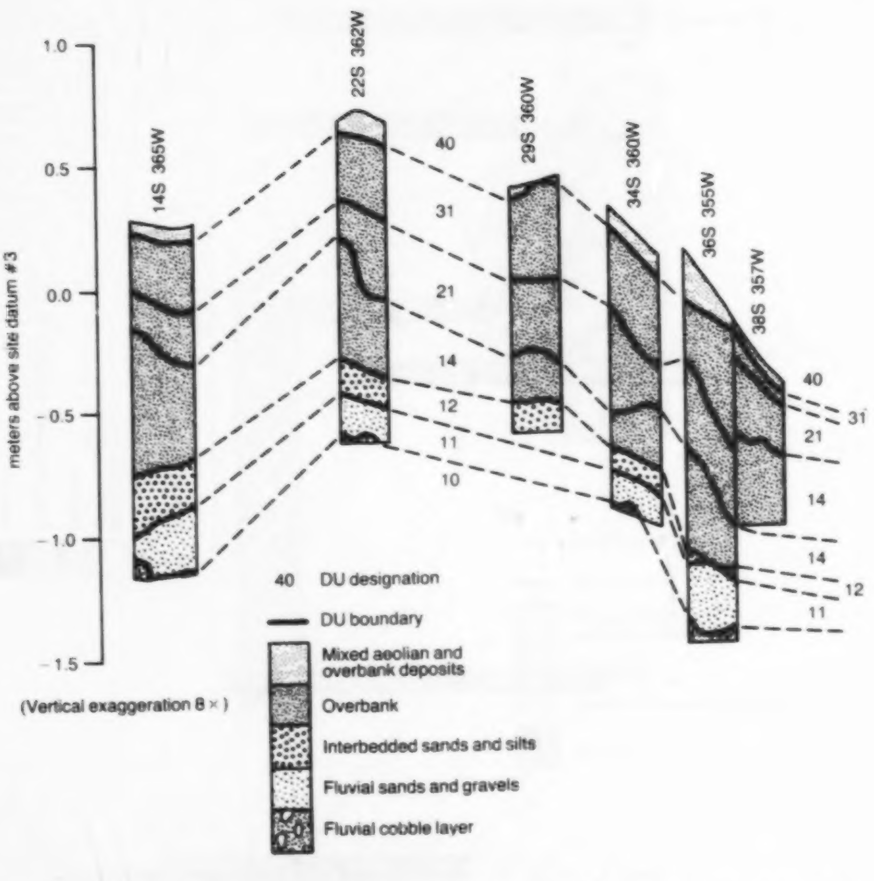

1.0
0.5
0.0
-0.5
-1.0
-1.5
meters above site datum #3
(Vertical exaggeration 8 ×)
14S 365W
22S 362W
29S 360W
34S 360W
36S 355W
38S 357W
40
31
21
14
12
11
10
40
31
21
14
14
12
11
40 DU designation
DU boundary
Mixed aeolian and overbank deposits
Overbank
Interbedded sands and silts
Fluvial sands and gravels
Fluvial cobble layer

Figure 2-6. North-south stratigraphic cross section of 45-OK-2 at 365W. For description of depositional units, see Table 2-1.

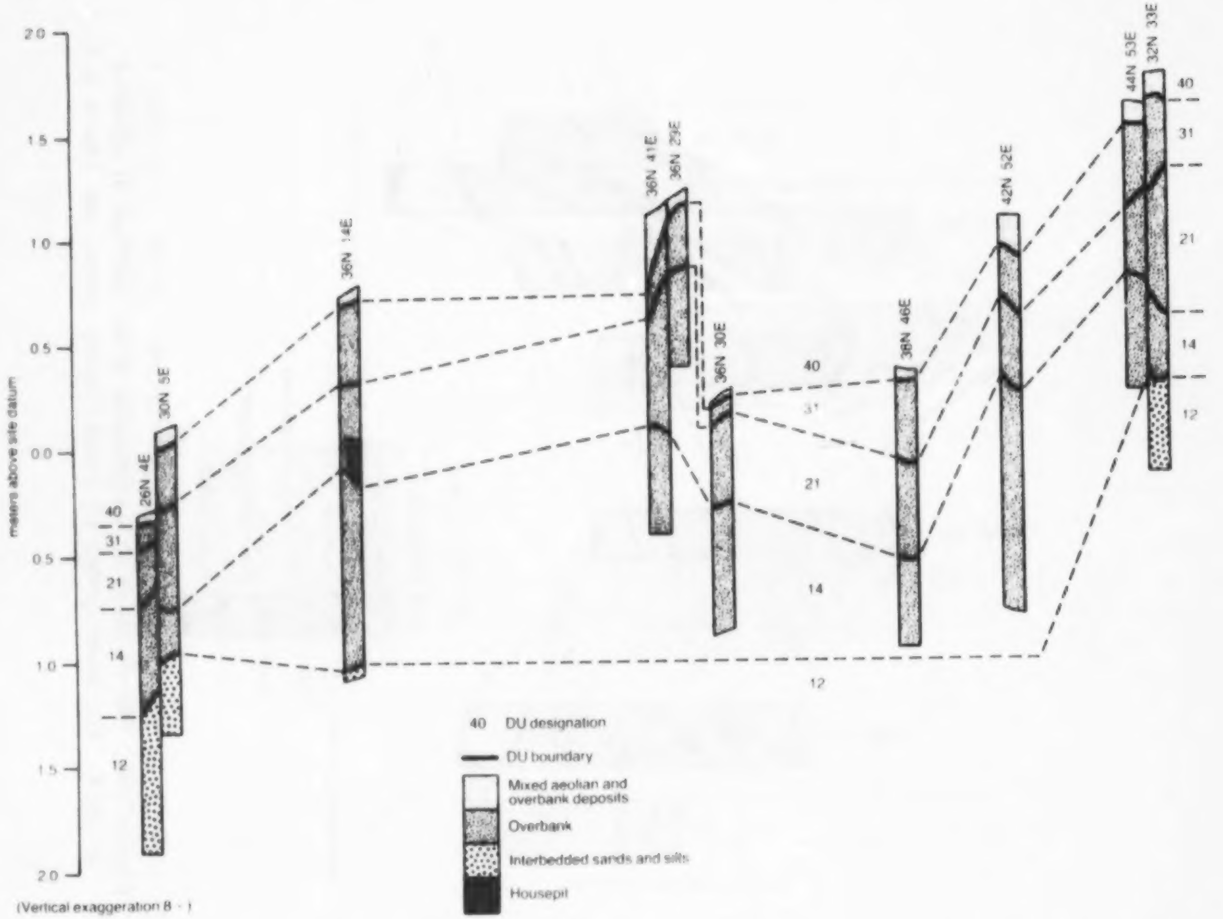

2.0
1.5
1.0
0.5
0.0
0.5
1.0
1.5
2.0
meters above site datum
(Vertical exaggeration 8 : 1)
26N 4E
30N 5E
36N 14E
36N 41E
36N 29E
36N 30E
38N 46E
42N 52E
44N 53E
32N 33E
40
31
21
14
12
40 DU designation
DU boundary
Mixed aeolian and overbank deposits
Overbank
Interbedded sands and silts
Housepit

Figure 2-7. East-west stratigraphic cross section of 45-OK-2A at 34N. For description of depositional units, see Table 2-2.

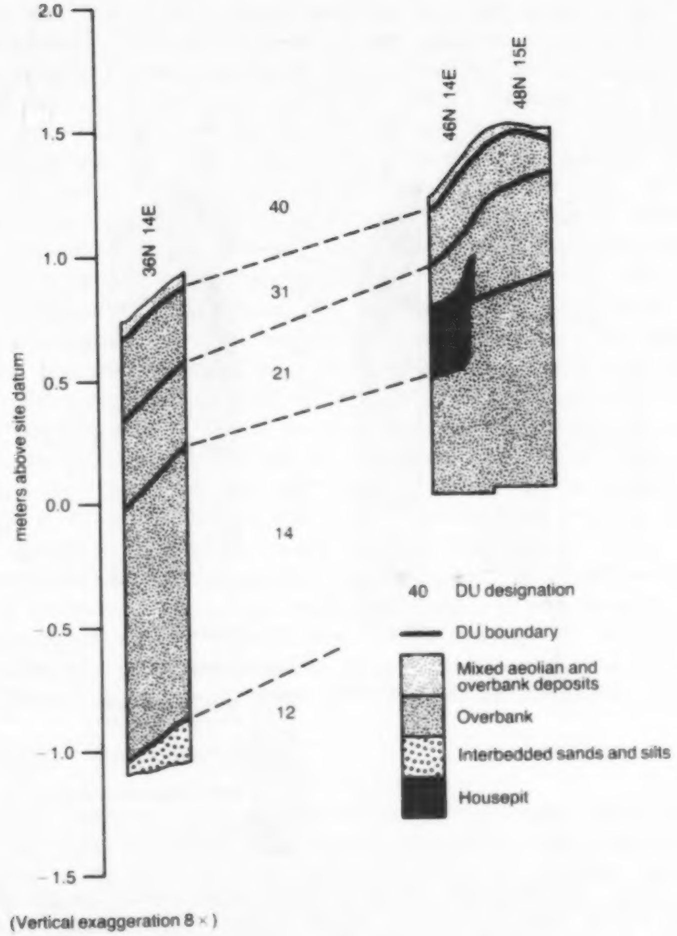

2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
meters above site datum
36N 14E
46N 14E
48N 15E
40
31
21
14
12
40 DU designation
DU boundary
Mixed aeolian and overbank deposits
Overbank
Interbedded sands and silts
Housepit
(Vertical exaggeration 8 ×)

Figure 2-8. North-south stratigraphic cross section of 45-OK-2A at 15E. For description of depositional units, see Table 2-2.

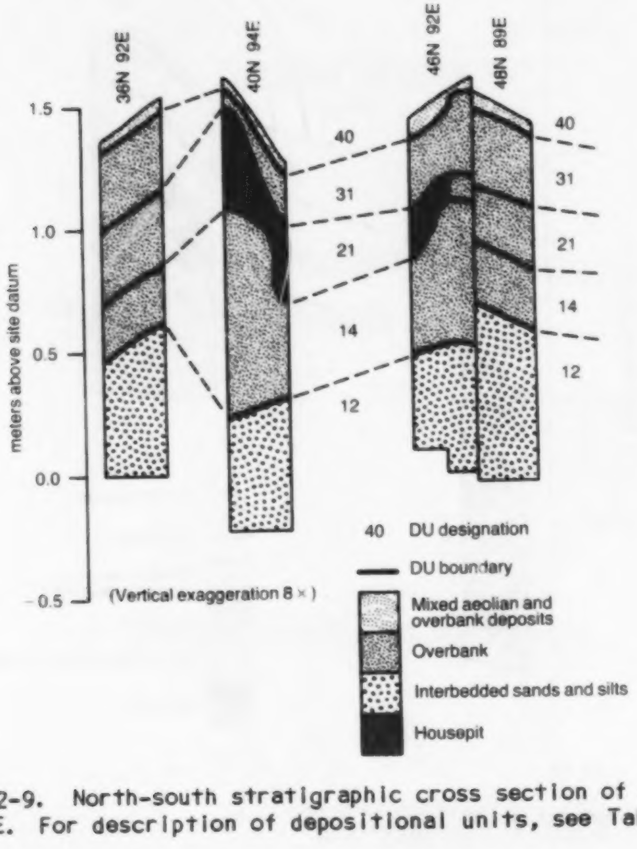

36N 92E
40N 94E
46N 92E
48N 89E
1.5
1.0
0.5
0.0
-0.5
meters above site datum
40
31
21
14
12
40
31
21
14
12
(Vertical exaggeration 8 ×)
40 DU designation
DU boundary
Mixed aeolian and overbank deposits
Overbank
Interbedded sands and silts
Housepit

Figure 2-9. North-south stratigraphic cross section of 45-OK-2A at 92E. For description of depositional units, see Table 2-2.

CHANNEL DEPOSIT: DU 10

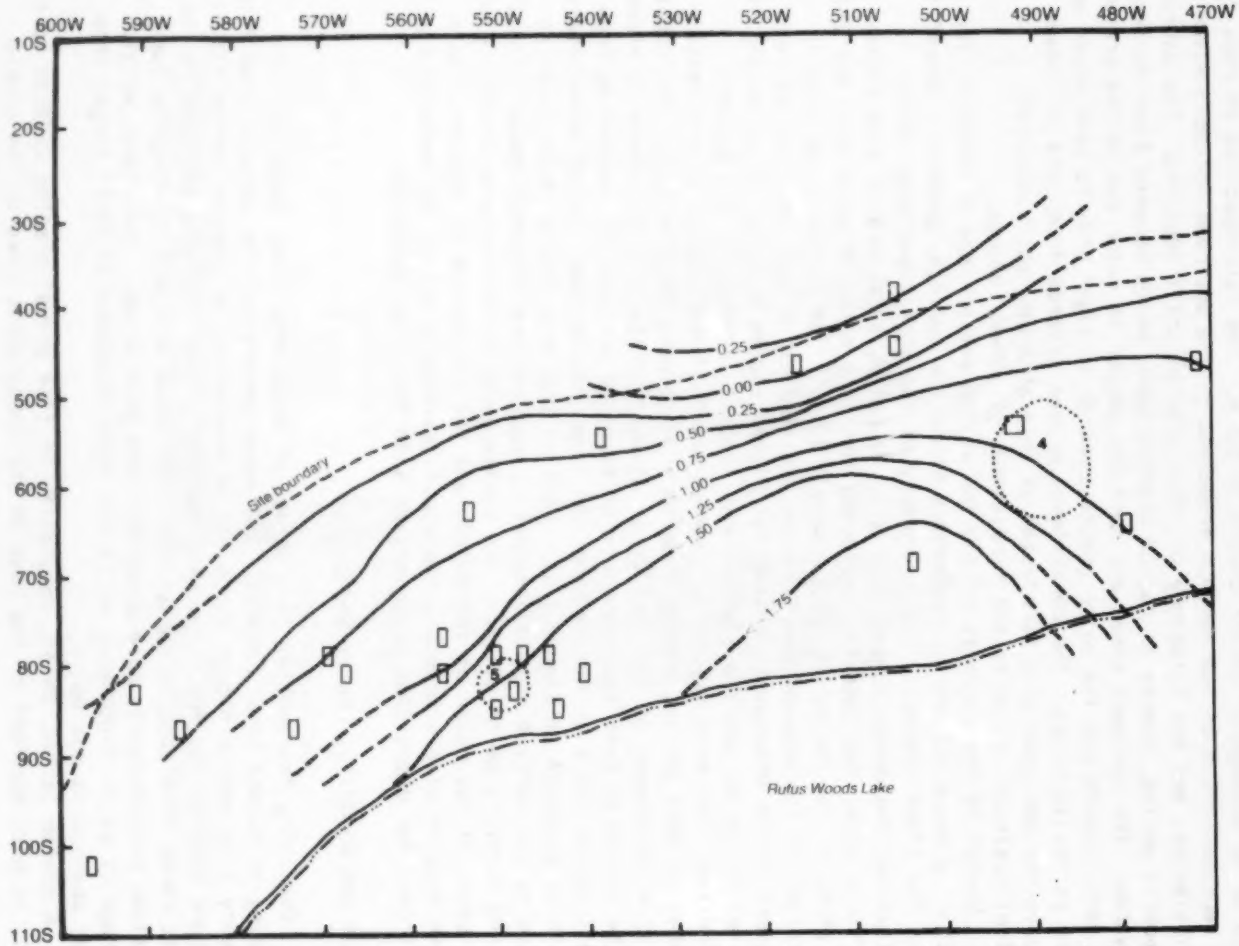
The oldest deposit encountered in excavation, DU 10, is a channel bottom deposit of the Columbia River. The gravels are dominated by subrounded to rounded, granitic and gneissic clasts to and exceeding 1.0 m in diameter and angular to subangular basalt clasts to 0.5 m. The full spectrum of rock types is representative of the terrain traversed by the upstream Columbia River and tributaries, and the lithology of local glacial drift deposits. The matrix is a poorly sorted, coarse to medium grained sand, which becomes finer in texture upwards. The coarsest sands are salt and pepper in color due to the presence of mafic clasts and the color grades upwards to light gray to pale brown and pale yellowish brown. The consistence grades upwards from hard to loose. Excavation was generally terminated at this stratum, which occurred ubiquitously in all units not terminated for other reasons.

Except in the vicinity of the fan at the eastern end of 45-OK-2, the channel gravels lie one to two meters below the surface, generally deeper away from the river channel. The topography of the cobble surface, which influenced the deposition of overlying deposits, particularly with regard particle size, has been reconstructed for both sites (Figures 2-10 and 2-11). At 45-OK-2, the relief is approximately 1.5 m. The contours run roughly parallel to the present shoreline at the western end of the site, while at the eastern end an embayment between two higher ridges occurs. At 45-OK-2A, the relief is 2.0 m, and the contours run roughly parallel to the present shoreline. The more regular surface at 45-OK-2A may be due to the small number of data points, rather than to a difference in structure. The cobble stratum is exposed at the surface at 45-OK-2A (Figure 1-15), where it appears to be contoured over the lower extremity of an alluvial fan emanating from a small canyon 100 m to the north of the site (the unnamed canyon immediately north of 45-OK-2A on Figure 1-1). East of 140E the cobble layer is still close to the surface and, consequently, excavations extended deeper into it. It was found to be stratified, the strata being differentiated primarily on the basis of the color of the matrix and the percentage of angular clasts. These angular clasts probably represent reworked alluvial fan materials or continued fan deposition intermittent with the river deposits.

LOWER BAR DEPOSITS: DU 11 and DU 12

Overlying the cobbles is a series of sands and loamy sands (DU 12) tending to become finer upwards. The sands generally fine upwards from fine to very fine sand although there may be coarsening or greater variability in texture towards the top. The soil textural classifications assigned in the field range from sand to sandy loam. The sands are soft to slightly hard, massive, predominantly pale brown and very pale brown. Individual strata average 11 cm in thickness, while the total thickness of DU 12 ranges from local absence to one meter.

A coarse facies, DU 10, consisting of fine gravel grading upwards to fine sand, is most apparent at the base in the topographic lows of the cobble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110S
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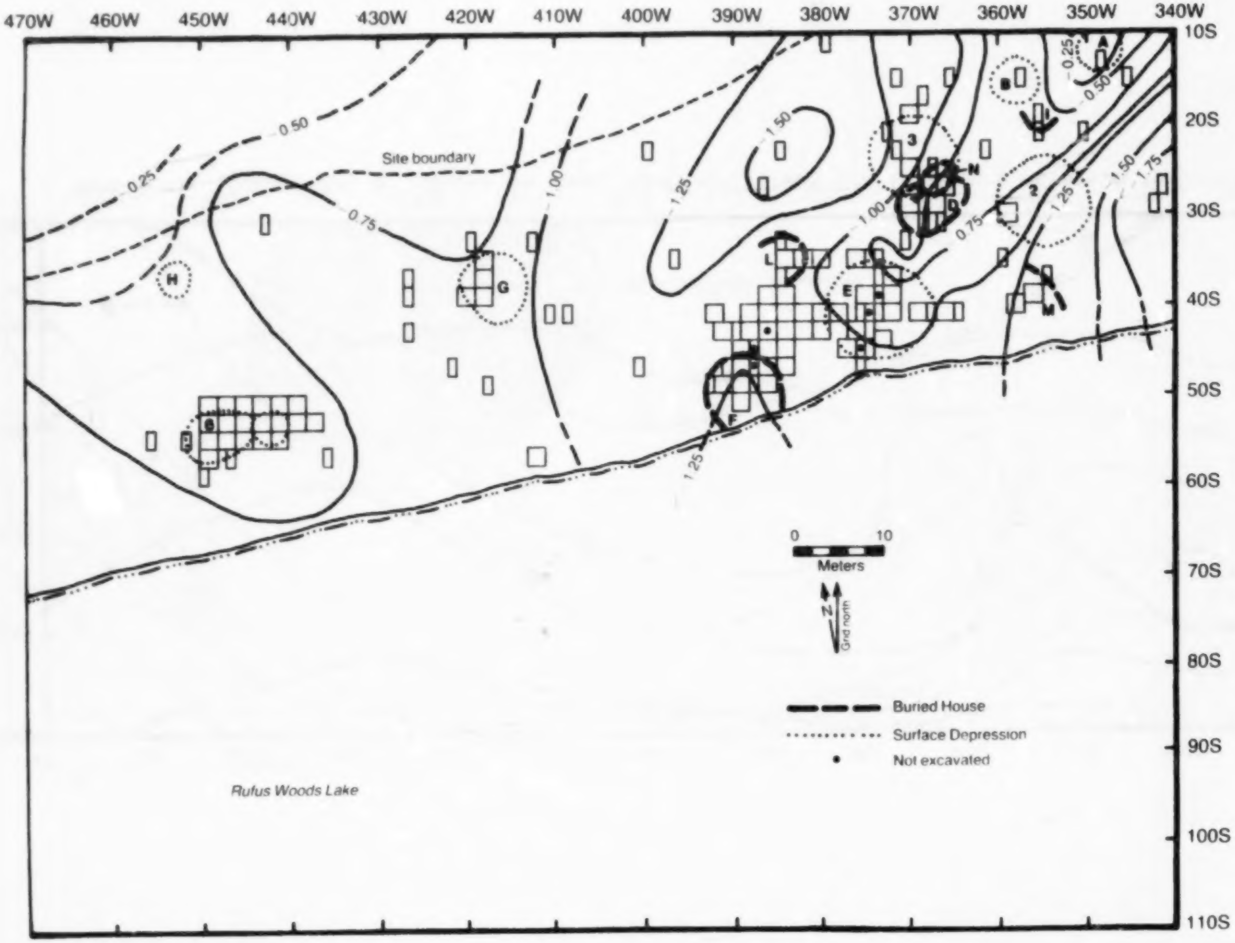
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Site boundary
4
5
Rufus Woods Lake

Figure 2-10. Topography of cobble surface, 45-OK-2 (elevation in meters relative to Datum 3).


470W
460W
450W
440W
430W
420W
410W
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390W
380W
370W
360W
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340W
10S
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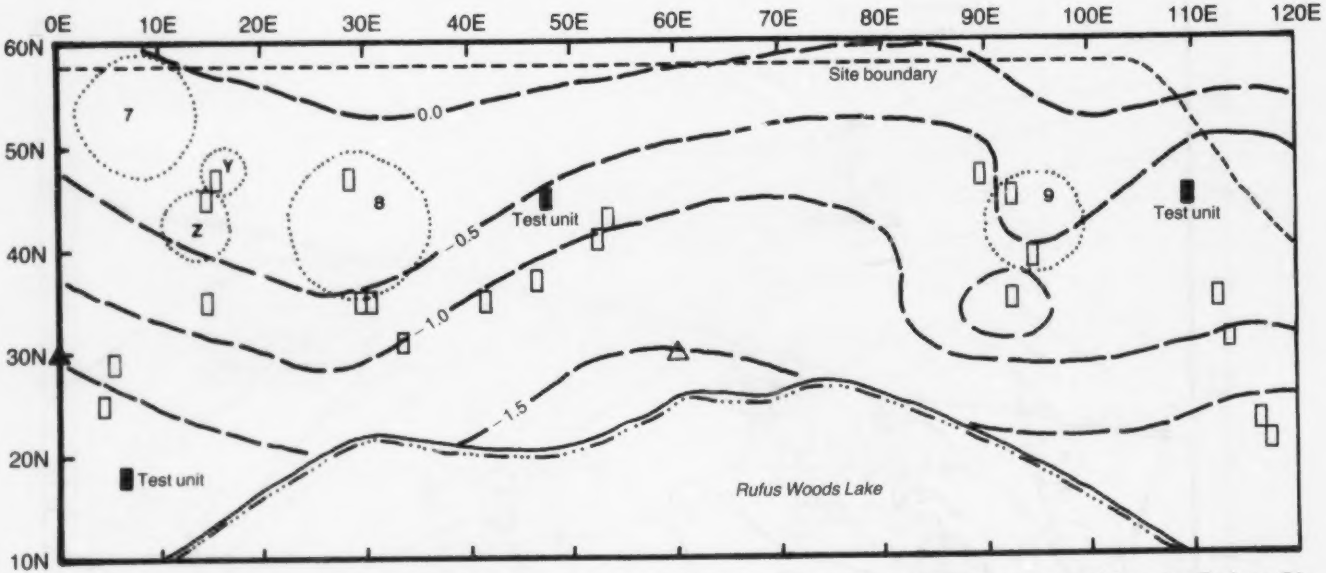
30S
40S
50S
60S
70S
80S
90S
100S
110S
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Site boundary
A
B
D
E
F
G
H
L
M
N
2
3
0
10
Meters
N
Grid north
Buried House
Surface Depression
Not excavated
Rufus Woods Lake

Figure 2-10. Cont'd.


0E
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30N
20N
10N
Site boundary
0.0
−0.5
−1.0
−1.5
7
Y
Z
8
9
Test unit
Test unit
Test unit
Rufus Woods Lake

Figure 2-11. Topography of cobble surface, 45-OK-2A (elevation in meters relative to Datum 3).

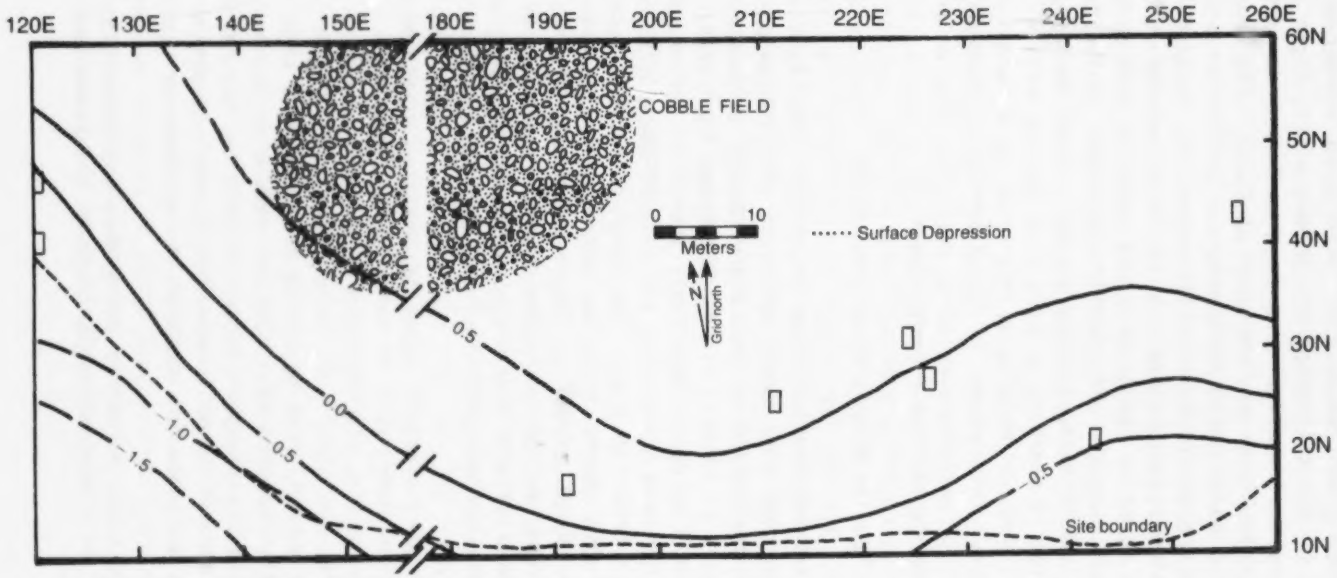

120E
130E
140E
150E
180E
190E
200E
210E
220E
230E
240E
250E
260E
60N
50N
40N
30N
20N
10N
COBBLE FIELD
0
10
Meters
N
Grid north
...... Surface Depression
0.5
0.0
-0.5
-1.0
-1.5
-0.5
Site boundary

Figure 2-11. Cont'd.

surface at 45-OK-2. It was not sufficiently extensive or thick at 45-OK-2A to be differentiated.

Commonly, the sands are interbedded with compact strata with high silt fractions. These were given the soil textural classifications of sandy loam to loam in the field. The silt bands are predominantly light gray to very pale brown, hard, and well sorted. They tend to form beds rather than lenses at 45-OK-2, although the reverse is true at 45-OK-2A. The average thickness of beds and lenses is about eight centimeters. Contacts between the silt bands and the sands are abrupt but locally irregular, indicating postdepositional deformation, probably while still saturated.

The silt bands occur in topographic low areas at both sites and do not extend to the norther margins. At 45-OK-2 they occur on the "lee" side of high points of the cobble surface (Figure 2-12). Fine-textured sediments such as these are deposited in standing or very slow moving waters, such as slackwater after a flood, or ponding of the river by a landslide. Lenses of cultural material occur interbedded in these deposits. Because we do not know if these are primary or secondary cultural deposits, they do not necessarily shed any light on the depositional environment.

UPPER BAR DEPOSITS: DU 14, DU 21, DU 31, AND DU 40

Conformably overlying the lower bar deposits is DU 14, a series of very fine to fine, well sorted, soft loamy sands and sandy loams which become coarser upwards. A compilation of laboratory results derived from sediment samples from this unit at 45-OK-2 yields an average sand/silt/clay distribution of 61/34/5 percent, negatively skewed on the phi-size scale. The color is predominantly pale brown with significant amounts of very pale brown, light gray, and light brownish gray. The upper contact is generally clear to gradual (2.5 to 12.7 cm); there is no indication of a stable surface or unconformity between DU 12 and DU 14. The overbank deposits of DU 14 are less weathered and have less aeolian admixture than the overlying overbank deposits. Within these strata, the presence of both staining and artifacts indicates cultural occupation. At least one structure is apparent in the profiles at 45-OK-2.

Above DU 14 are more overbank deposits, massive strata of well sorted, soft, very fine to fine loamy sand to sandy loam. These have been divided into two depositional units, distinguishable primarily by color, stratigraphic position, and cultural horizons. The lower deposit, DU 21, is similar in texture to DU 14 but darker in color, being predominantly pale brown to brown. The sand/silt/clay distribution at 45-OK-2 is skewed to sand with a clay tail. Evidence of cultural occupation, including structures, occurs in this deposit at both sites. The deposit is continuous across most of the site, but thins away from the river, and does not occur in the northwestern portion of 45-OK-2.

The overlying DU 31 is darker in color than the underlying sediments but similar in texture. It is relatively uniform in thickness and appearance.

The most recent deposits at the site consist of thin, laminated layers of loamy sand and a vegetation mat, DU 40. Flood deposition is indicated by the lamination, and there is undoubtedly some aeolian contribution as well. This deposit covers occupation areas from which trade goods have been recovered, thus dating from the historic period. In 80S541W the deposit overlies Osborne's backdirt, but is not so recent in all areas of the site. Most of the sediment probably derives from the 1894 and 1948 floods.

East of 140E at 45-OK-2A, the cobble surface is overlain by two distinct overbank deposits capped by a vegetation mat. While the lower of the two units is physically similar to DU 14, and is probably the same deposit, the upper may be equivalent to either DU 21 or DU 31, or both. Our inability to establish the equivalence of these strata is not a great disadvantage as these units contained almost no cultural materials, and apparently lie outside the site proper.

SLOPE WASH DEPOSITS: DU 22 and DU 32

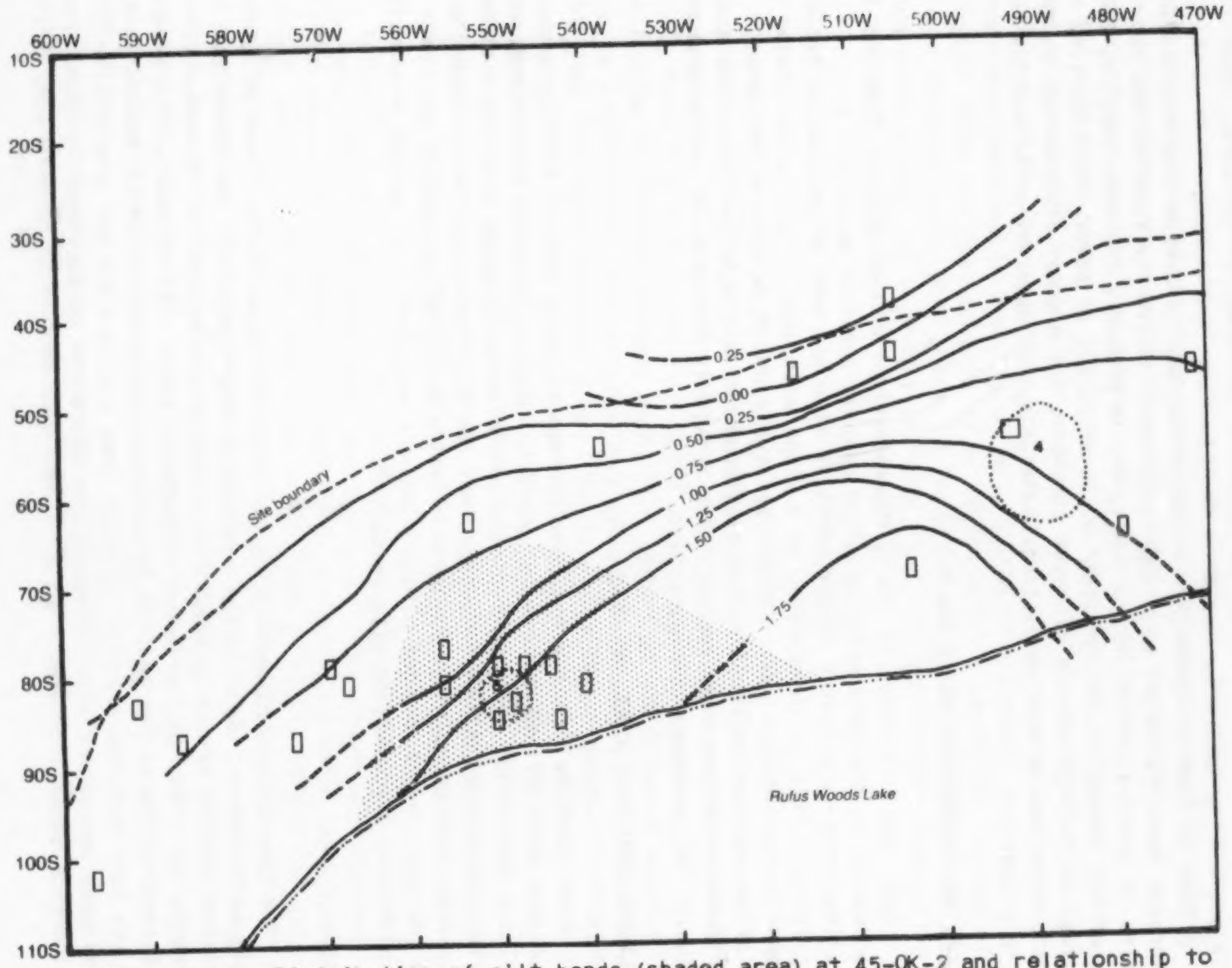
Near the hill slope in the northwestern portion of 45-OK-2 (Figure 2-13), the deposit in the same relative stratigraphic position as DU 21 is distinguished by slightly larger particle size and more pronounced particle angularity. This is interpreted as a slope wash deposit and is designated as separate depositional unit, DU 22. Similarly, DU 32 occurs in the same relative position as DU 31 but is distinguished by larger particle size and particles which are more angular. Its proximity to the slope of the western alluvial fan is shown in Figure 2-13.

CULTURAL ANALYTIC ZONES, 45-OK-2

Four separate cultural episodes corresponding to natural stratigraphic divisions were defined as cultural analytic zones. The zones are summarized in Table 2-3, which shows the correlation of cultural zones with depositional units, associated radiocarbon dates, and the artifactual contents. Materials recovered from backdirt in trenches or units excavated by Osborne and Lyman are included in the unzoned category and are excluded from further analysis. Each zone is discussed briefly below.

ZONE 4

The assemblage recovered from the lower bar deposits DU 11 and DU 12 is assigned to Zone 4. This is the smallest assemblage of all the zones, but the artifact density is nearly identical to the overlying Zone 3. A number of features were recorded, although evidence of structures is scant. The smaller excavated volume is due both to termination of excavation units above Zone 4, and the fact that the deposits in which Zone 4 occurs are not completely continuous across the site, pinching out where the cobble layer is high. Four radiocarbon dates from Zone 4 cover a 1000 year span from 3000 to 4000 B.P.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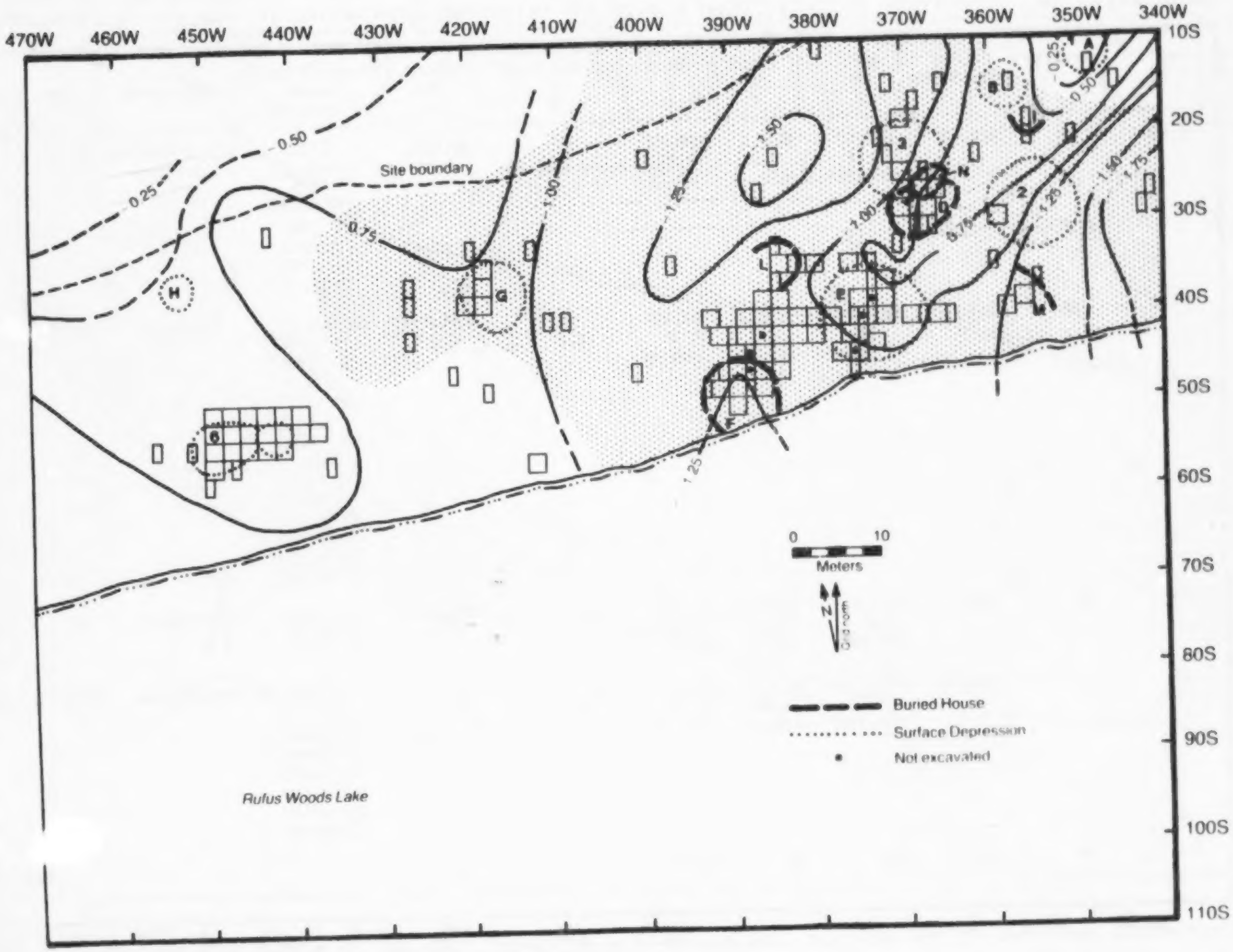
0.50
0.75
1.00
1.25
1.50
1.75
Site boundary
Rufus Woods Lake

Figure 2-12. Distribution of silt bands (shaded area) at 45-OK-2 and relationship to cobble surface (contours in meters relative to Datum 3).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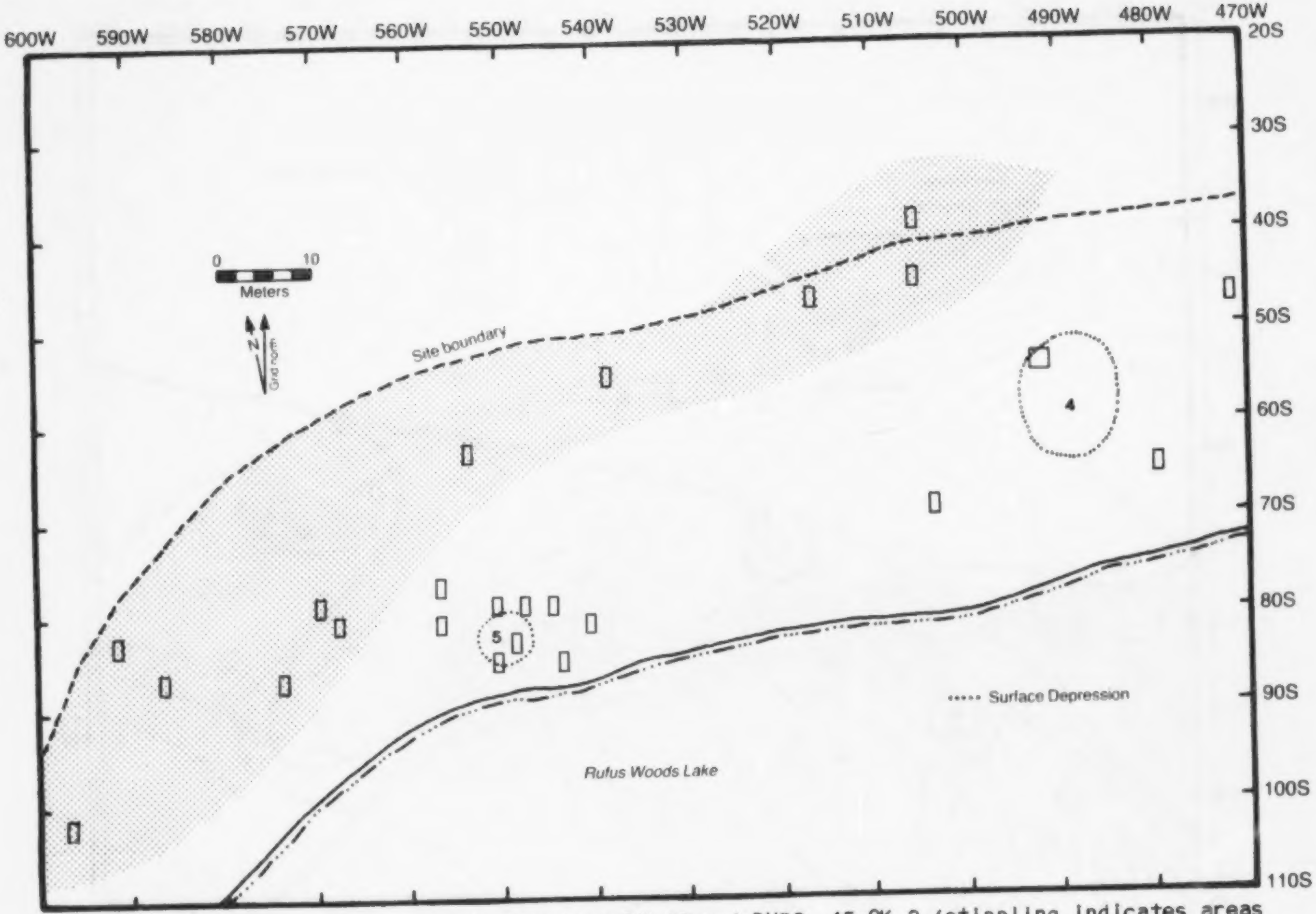
100S
110S
Site boundary
0.25
0.50
0.75
1.00
1.25
1.50
1.75
A
B
E
F
G
H
K
L
N
2
3
6
0
10
Meters
N
Grid north
Buried House
Surface Depression
Not excavated
Rufus Woods Lake

Figure 1-12. Cont'd.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500W
490W
480W
470W
20S
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40S
50S
60S
70S
80S
90S
100S
110S
0
10
Meters
N
Grid north
Site boundary
4
5
Surface Depression
Rufus Woods Lake

Figure 2-13. Extent of slope wash deposits, DU 22 and DU32, 45-OK-2 (stippling indicates areas where DU 22 and 32 occur, or vegetation mat directly overlies DU 10).

Table 2-3. The analytic zones of 45-OK-2: their stratigraphic definition, radiocarbon dates, and contents.

Zone	DU[1]	Description	Radiocarbon[2] Dates (Years B.P.)	Lithics N %	Modified Non-Lithics N %	Bone N %	Shell N %	FMR N %	Total[2] Artifacts	Features N	Volume m^3	Density Objects/ m^3
1	31,40	overbank and aeolian	<110 (B-4281) <170 (B-4278) 196± 70 (B-2525) 227± 80 (B-4276)	12,553 13.5	39 0.0	67,884 72.7 13,387	2,528 2.7 957	10,344 11.1 2,177,446	93,323	34	152.9	610.4
2	21,22	overbank	529± 89 (B-4283) 556± 80 (B-2526) 783± 58 (B-4279) 839± 68 (B-2524) 1112± 95 (B-4275) 1131±169 (B-4280) 1268± 95 (B-4277)	3,997 3.3	33 0.0	88,808 73.7 16,610	20,782 17.2 26,419	6,928 5.7 1,666,698	120,548	49	131.5	916.7
3	14	overbank	3086± 76 (B-4272)	1,920 2.6	51 0.1	44,340 60.5 11,069	23,906 32.6 7,610	3,104 4.2 850,275	73,321	23	97.7	750.5
4	11,12	point bar	3001±95 (B-4282) 3414±114 (B-4271) 3926±156 (B-4273) 3977±153 (B-4274)	917 1.5	18 0.0	35,755 56.9 10,759	24,899 39.6 13,634	1,234 2.0 331,441	62,824	21	84.7	741.7
Unzoned				154	0	1,168	32	114	1,672	3	6.1	274.1

[1] Depositional Unit.

[2] Dendro-corrected date in years B.P., lab sample number given in parentheses. See Table A-1 for additional information.

[3] Historic and miscellaneous categories excluded.

ZONE 3

Zone 3 includes the cultural materials from the oldest overbank deposits at the site, DU 14. The assemblage is smaller than the overlying zones, but the density of cultural materials is still quite high, 750.5 objects/m^3. Two houses occur in this zone. Zone 3 is missing in some areas because DU 14 pinches out, and in other areas because of intrusive pits emanating from Zone 2. Because of this, and because a number of purposive units were excavated only through Zone 2, the excavated volume is considerably smaller than that for Zones 1 and 2. A single radiocarbon date, 3066±76 was obtained from Zone 3.

ZONE 2

Cultural materials from the overbank deposits of DU 21, and the stratigraphically equivalent slope wash deposits, DU 22, are assigned to Zone 2. The assemblage, which is the largest at the site, is almost entirely from the overbank deposits, as cultural materials in the slope wash deposit were scant. The density of cultural materials, 916.7 objects/m^3, is also the highest of the four zones. The large feature assemblage includes a number of house structures, indicating a primary occupation deposit. Zone 2 was found across the entire site except in a few areas where it had been removed by previous archaeological excavations, or by intrusive features from Zone 1. The six radiocarbon dates obtained from Zone 2 fall within the 700 year period between 500 B.P. and 1200 B.P.

ZONE 1

Cultural materials associated with the uppermost massive overbank deposits, DU 31, stratigraphically equivalent slope wash, DU 32, and the overlying historic flood deposits, DU 40, are assigned to Zone 1. Virtually the entire assemblage, second in size only to that from Zone 2, was obtained from the extensive overbank deposits. The slope wash, limited in extent, contained few artifacts. Although younger in age, the relatively thin layer of historic flood deposits could not easily be segregated and contains relatively few cultural materials in any event. The large feature assemblage, which includes houses, established with certainty that this is a primary occupational deposit. The overall density of cultural materials is quite high, 610.4 objects/m^3, but nonetheless the lowest density of all zones at the site. Zone 1 is distributed across the entire site except in a few areas where the upper sediments had been removed by previous excavations. The four radiocarbon dates from Zone 1 fall in a 300 year range, from modern to 300 B.P.

CULTURAL ANALYTIC ZONES, 45-OK-2A

Five separate cultural episodes corresponding to natural stratigraphic divisions were defined as cultural analytic zones. The zones are summarized in Table 2-4, which shows the correlation of cultural zones with depositional units and the contents of each zone. No radiocarbon dates were obtained from 45-OK-2A. Materials from the fill of Osborne's trenches were put in the unzoned category and are excluded from further analysis. Each zone is discussed briefly below.

ZONE 5

In the units east of 140E, excavation extended for a few unit levels into the cobbles, and the recovered materials are assigned to Zone 5. The density of recovered materials, 5.4 objects/m^3 is the lowest at the site, and no features were found. Of the 26 objects comprising the assemblage, 18 (over 70%) are pieces of bone and shell. These could have been incorporated naturally into the sediments and do not necessarily indicate a cultural assemblage.

ZONE 4

Only a very small amount of cultural material was found in the lower bar deposits, DU 11 and DU 12; these are defined as Zone 4. The density of cultural materials is slightly greater than that of Zone 5. No features were found in these deposits.

ZONE 3

Cultural materials recovered from DU 14 were assigned to Zone 3. Although their density is slightly higher than in Zone 4, it is still considerably less than in the overlying Zone 2. The assemblage is small and features were found in these deposits.

ZONE 2

Cultural materials associated with the overbank deposits of DU 21 are defined as Zone 2. The large assemblage is similar in size to that of Zone 1, and the density of cultural materials is also very similar. Features were more abundant in this zone than in any other and include several houses.

ZONE 1

The cultural materials associated with the uppermost deposits at 45-OK-2A, DU 31 and 40, are assigned to Zone 1. These deposits yielded the highest density of cultural materials at the site, and the assemblage is the largest. Structured features indicate a primary deposit.

Table 2-4. The analytic zones of 45-OK-2A: their stratigraphic definition, radiocarbon dates, and contents.

Zone	DU[1]	Description	Lithics N %	Non-Lithics N %	Bone N % grams	Shell N % grams	FMR N % grams	Total Artifacts	Features N	Volume m³	Density Objects/ m³
1	40,31	overbank and aeolian	1,608 19.2	13 0.2	5,656 67.5 1,200	170 2.0 1	937 11.2 114,637	8,385	2	21.3	393.7
2	21	overbank	716 8.8	16 0.2	6,700 82.0 2,048	419 5.1 12	320 3.9 53,456	8,171	8	21.2	385.4
3	14	overbank	147 12.7	2 0.2	911 78.7 193	81 7.0 14	16 1.4 7,420	1,158	-	20.9	55.4
4	11	point bar	59 17.0	-	271 78.1 45	15 4.3 3	2 0.6 115	347	-	16.1	21.6
1+2 (Eastern)	20	overbank	27 28.1	-	40 41.7 12	1 1.0 -	28 29.2 18,215	96	-	5.3	8.7
5	10	alluvial fan	7 26.9	-	17 65.4 3	1 3.8 -	-	26	-	4.8	5.4
Unzoned			18	-	2	-	-	20	-	1.0	20.0

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[1] Depositional Unit

ZONES 1 AND 2, EAST OF 140E

In the units east of 140E, the stratum underlying the vegetation mat may correlate with either DU 31, DU 21, or both. As shown in Table 2-4, the number of artifacts in this ambiguous situation is very small. In fact, this area of the site can be considered to lie outside the true site boundaries. The density of cultural materials is only slightly higher than that in Zone 5. These materials are omitted from consideration in following chapters.

SUMMARY

The terrace on which the two sites lie is an erosional terrace cut into Pleistocene sediments, the lowest terrace created by dissection of the glaciolacustrine canyon fill by the Columbia River. This terrace may have been formed after human occupation of the canyon had begun; at the eastern end of 45-OK-2A, cultural materials were found in alluvial fan deposits which are interbedded with rounded river cobbles, presumably channel gravels of the Columbia River. Some time before 4000 B.P., the Columbia River migrated southward and incised deeper, leaving behind a cobble-covered terrace. Overlying the basal channel gravels left by the rapidly incising river are more recent constructional bar deposits.

The lower bar deposits are variable in texture and well stratified, with evidence of episodic ponding. Deposition was greatly influenced by the topography of the cobble surface. In higher areas, the cobble field was exposed for some time, while in the lower areas accretion of fluvial gravels and sand began immediately. These grade laterally and vertically to fine sands. In the topographically low areas, these are interbedded with slackwater deposits, thin, extensive silt bands. Features and artifacts are found directly on the cobble surface, as well as in the overlying stratified sands and silts.

The upper bar deposits are massive strata of fine uniform texture, with a negative skewness on the phi-size scale. These characteristics are typical of floodplain overbank deposits, and indeed there is evidence of levee formation in the site topography. Accretion of the overbank deposits began by 3000 B.P, and continued until historic times. The uniform grading of color from light to dark upwards indicates some degree of soil development. Otherwise, the strata are very similar and the boundaries gradual. No prominent site-wide unconformities were noted. Division of these strata into three depositional units relied on stratigraphic position and on cultural horizons. Dense layers of cultural materials are good indicators of surfaces that represent depositional hiatuses. The three depositional units, DU 14, dating between 3000 and 1500 B.P., DU 21, dating between 1500 and 500 B.P., and DU 31, dating from 500 B.P. until historic times, contain abundant evidence of human occupation.

Slope wash deposits at the western margin of 45-OK-2, DU 22 and 32, are contemporaneous with DU 21 and 31. Very few cultural materials occur in this area. The overbank deposits cannot all be traced to the eastern area of

45-OK-2A, which has apparently received less sedimentation than the rest of the terrace. However, cultural materials are extremely rare in this area.

3. ARTIFACT ANALYSES

The inhabitants of 45-OK-2 and 45-OK-2A left behind large numbers of stone, bone, shell, wood, and other objects bearing evidence of their use or manufacture by human hands. Several independent analyses, designed to address different types of information or specific materials, were applied to these objects. All the analyses shared common goals: to provide categories useful for quantitative description and comparison of larger units of analysis, features, zones, and sites; and to describe the artifacts by categories and variables which can be related to artifact analyses in previous regional research.

Technological analysis of the large assemblage of worn and modified lithics --53,508 from zoned contexts at 45-OK-2 and 2,532 from zoned contexts at 45-OK-A--demonstrates several distinct lithic industries that used specific material types and reduction techniques. These lithic industries were practiced with little change throughout the 4,000 year span of occupation. The relative importance of the industries changed, however, resulting in different relative proportions of material types. Variations in the relative frequency of technologically equivalent materials may reflect exhaustion of some local sources and substitution of others. Functional analysis of lithic artifacts indicates a complex tool kit in all occupations at the site, with some changes in the relative importance of certain tool types.

Analyses and interpretations of manufactured/utilized bone, shell and wood, and historic artifacts are not so detailed as the lithic analyses because of smaller assemblage size and the smaller body of regional research on artifacts of these materials. Participation in a regional tradework throughout the history of the site is demonstrated by shell artifacts ultimately deriving from coastal regions. The assemblage of historic artifacts reveals various facets of material culture change with contact; working of introduced raw materials by existing techniques, modification of forms for other purposes, adoption of personal ornaments, and integration of functional items.

Stylistic analysis of ornaments, including pendants and beads of diverse materials, shows major changes in the types of ornaments, particularly in the historic occupation. The stylistic analysis of stone projectile points indicates changes in popularity of point types consistent with sequences described elsewhere in the Plateau.

LITHIC TECHNOLOGY

Stone tools played an essential role in the existence of the prehistoric inhabitants of the project area, providing the means for procuring and processing plant and animal foods, making shelters and clothing, and performing other tasks dictated by survival and cultural tradition. The ubiquity of stone tools at sites and the enormous number of lithic objects which are by-products of the manufacturing process indicate the importance of these tools and the complexity of the manufacturing sequence. The stages of lithic manufacturing, from procurement through initial reduction and final retouching, often took place at more than one location. At each step, several factors influenced the choices made: the availability of different raw materials, the desired end-product, and cultural traditions.

Technological analyses of lithic materials examine debitage and finished products to describe some aspect of the manufacture of lithic tools from natural raw materals. We used five classificatory dimensions in this technological analysis: object type, material, condition, dorsal cortex and treatment (Appendix B, Table B-1). The attributes of length, width, thickness, and weight supplement the five primary dimensions. For additional information on object type, the formal type names given during functional analysis (listed and defined in Appendix B) to all lithic objects except unmodified flakes and chunks have been cross-referenced with the technological data. This limited set of attributes provide a simple summary of lithic reduction appropriate to the descriptive nature of this report.

In the first part of the technological analysis, we define lithic industries by examining the lithic materials present at the site, and the various forms in which they occur. In the second part of the analysis, we compare the zones for evidence of changes in technology through time.

DESCRIPTION OF LITHIC MATERIALS

A lithic industry is a set of reduction techniques resulting in a distinct set of products, practiced on a selected set of materials. Lithologic identity is essential for the recognition of industries, as it is the only means of linking the different products of a single reduction sequence. Because we do not know **a priori** what lithologic distinctions correspond to culturally meaningful raw material categories, stone material was recorded in as many distinctive lithologies as possible. Reduction sequences using different materials but with similar products and by-products are grouped together to define industries. However, just as a single industry may utilize several lithologically defined raw materials, a single lithologic material may be regularly used in more than one reduction sequence. Within a single material category, the products of different reduction sequences are separable only by referring to established models of lithic reduction.

Fifteen materials were recorded at 45-OK-2, and nine at 45-OK-2A (Tables 3-1 and 3-2). At both sites, four material types--jasper, quartzite, chalcedony, and opal--account for the bulk of the assemblage. Other materials--obsidian, fine-grained quartzite, basalt, fine-grained basalt,

Table 3-1. Object types by material, 45-OK-2.

Object Type		Jasper	Chalcedony	Petrified Wood	Opal	Obsidian	Quartzite	Fine-Grained Quartzite	Basalt	Fine-Grained Basalt	Granitic Materials	Steatite	Siltstone/ Mudstone	Silicized Mudstone	Argillite	Schist	Shale	Indeterminate
Conchoidal Flake	N	16,300	9,841	500	9,205	101	131	29	218	431	14	–	–	166	10	–	–	1
	%	85.9	91.4	78.1	84.7	91.8	1.2	65.9	64.9	97.1	25.0			92.2	66.7			2.1
Blade	N	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	%			–														
Core	N	5	5	–	7	–	–	–	–	–	–	–	–	–	–	–	–	–
	%	–	–		0.1													
Linear Flake	N	14	28	–	4	–	–	–	–	–	–	–	–	–	–	–	–	–
	%	0.1	0.3		–													
Resharpening Flake	N	11	16	3	7	–	–	–	–	–	–	–	–	–	–	–	–	–
	%	0.1	0.1	0.5	0.1													
Tabular Flake	N	–	–	1	–	–	9,871	6	1	–	–	20	–	–	–	4	–	2
	%			0.2			88.7	13.6	0.3			87.0				66.7		4.7
Chunk	N	1,823	411	61	1,198	5	758	3	6	4	3	–	–	4	–	1	1	4
	%	8.6	3.8	9.5	11.0	4.5	6.8	6.8	1.8	0.9	5.4			2.2		16.7	50.0	8.3
Projectile Points and Fragments	N	158	57	9	61	2	–	–	4	6	–	–	–	1	4	–	–	–
	%	0.3	0.5	1.4	0.6	1.8			1.2	1.4				0.6	26.7			
Biface	N	178	63	22	102	–	3	–	5	2	–	–	–	3	1	–	–	–
	%	0.9	0.6	3.4	0.9		–		1.5	0.5				1.7	6.7			
Burin	N	1	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	%	–	–	0.2														
Drill	N	3	5	–	4	–	–	–	–	–	–	–	–	–	–	–	–	–
	%	–	–		–													
Graver	N	8	5	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–
	%	–	–		–													
Scraper	N	18	9	3	2	–	–	–	–	–	–	–	–	–	–	–	–	–
	%	0.1	0.1	0.5	–													
Tabular Knife	N	–	–	–	1	–	336	2	1	–	5	–	–	–	–	–	–	–
	%				–	–	3.0	4.5	0.3		8.9							
Bifacially Retouched Flake	N	102	46	11	31	–	3	–	–	–	–	–	–	1	–	–	–	1
	%	0.5	0.4	1.7	0.3		–							0.6				2.1
Unifacially Retouched Flake	N	159	55	11	50	–	3	1	1	–	–	–	–	2	–	–	–	–
	%	0.8	0.5	1.7	0.5		–	2.3	0.3					1.1				
Utilized Flake	N	383	216	18	191	2	2	1	1	1	1	–	–	3	–	–	1	–
	%	2.0	2.0	2.8	1.8	1.8	–	2.3	0.3	0.2	1.8			1.7			50.0	
Amorphously Flaked Cobble	N	–	–	–	–	–	2	–	–	–	2	–	–	–	–	–	–	–
	%						–				3.6							
Chopper	N	–	–	–	–	–	2	1	23	–	3	–	–	–	–	–	–	–
	%						–	2.3	6.8		5.4							
Hammerstone	N	–	–	–	–	–	7	1	17	–	8	–	–	–	–	–	–	–
	%						0.1	2.3	5.1		14.3							
Net Weight	N	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1
	%								0.3									2.1
Anvil	N	–	–	–	–	–	–	–	7	–	3	–	–	–	–	–	–	–
	%								2.1		5.4							
Edge-Ground Cobble	N	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–
	%								0.3									
Pestle	N	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–
	%										3.6							
Millingstone	N	–	–	–	–	–	–	–	13	–	5	–	–	–	–	–	–	–
	%								2.7		8.9							
Hopper Mortar Base	N	–	–	–	–	–	–	–	1	–	2	–	–	–	–	–	–	–
	%								0.3		3.6							
Bead	N	–	–	–	–	–	–	–	24	–	–	–	–	–	–	–	–	19
	%								7.3									39.6
Other Ground Stone	N	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	1
	%											13.0						2.1
Weathered/ Indeterminate	N	13	4	–	1	–	1	1	12	–	7	–	70	–	–	1	–	19
	%	0.1	–		–		–	2.3	3.6		12.5		100.0			16.7		39.6
Total		18,976	10,765	640	10,867	110	11,126	44	336	444	56	23	70	180	15	6	2	48

Table 3-2. Object types by material, 45-OK-2A.

Object Type		Jasper	Chalcedony	Opal	Obsidian	Quartzite	Basalt	Fine-Grained Basalt	Granitic Materials	Silicized Mudstone	Argillite	Indeterminate
Conchoidal Flake	N	1,510	412	51	-	-	3	2	1	2	2	1
	%	84.0	88.2	82.3			37.5	100.0	33.3	100.0	100.0	50.0
Linear Flake	N	1	3	-	-	-	-	-	-	-	-	-
	%	0.1	0.6									
Tabular Flake	N	-	-	-	-	140	-	-	-	-	-	-
	%					71.8						
Chunk	N	194	37	8	1	39	-	-	-	-	-	-
	%	10.9	7.8	12.9	100.0	20.0						
Projectile Points and Fragments	N	18	1	1	-	-	-	-	-	-	-	-
	%	1.0	0.2	1.6								
Biface	N	17	1	-	-	-	-	-	-	-	-	-
	%	1.0	0.2									
Drill	N	1	-	-	-	-	-	-	-	-	-	-
	%	0.1										
Graver	N	4	1	-	-	-	-	-	-	-	-	-
	%	0.2	0.2									
Scraper	N	4	2	-	-	-	-	-	-	-	-	-
	%	0.2	0.4									
Spokeshave	N	1	-	-	-	-	-	-	-	-	-	-
	%	0.1										
Tabular knife	N	-	-	-	-	13	1	-	1	-	-	-
	%					6.7	12.5		33.5			
Bifacially Retouched Flake	N	1	3	-	-	-	-	-	-	-	-	-
	%	0.1	0.6									
Unifacially Retouched Flake	N	4	3	1	-	-	-	-	-	-	-	-
	%	0.2	0.6	1.6								
Utilized Flake	N	28	11	1	-	-	-	-	-	-	-	-
	%	1.6	2.3	1.6								
Chopper	N	-	-	-	-	2	1	-	1	-	-	-
	%					1.0	12.5		33.3			
Hammerstone	N	-	-	-	-	1	1	-	-	-	-	-
	%					0.5	12.5					
Pestle	N	-	-	-		-	1	-	-	-	-	-
	%						12.5					
Bead	N	-	-	-	-	-	-	-	-	-	-	1
	%											50.0
Indeterminate	N	-	-	-	-	-	1	-	-	-	-	-
	%						12.5					
Total		1781	474	62	1	195	8	2	3	2	2	2

steatite, siltstone/mudstone, silicized mudstone, argillite, schist, and shale--occur only in small amounts. A small proportion of each assemblage could not be identified lithologically. These materials differ in their physical properties, and in the density, location and form of occurrence, thus offering different technological potential.

Jasper, chalcedony, petrified wood, opal, and obsidian are all either amorphous or cryptocrystalline siliceous materials (CCS) with predictable conchoidal fracture. The laminated structure of petrified wood, however, may make it tend to fracture non-conchoidally. Mechanical differences among the locally available jasper, opal, and chalcedony have not been studied, but observation suggests that opal is more brittle. The specific gravity of the mineraloid opal (1.9-2.2) is lower than that of the mineral quartz (2.65), of which jasper is a cryptocrystalline variety (Hurlbut 1966:479, 486). The term jasper, rather than chert is used for dark, comparatively dull, CCS materials, because chert is most commonly applied to marine deposited cryptocrystalline quartz. Low frequencies of chert do occur in the assemblages but the dominant material is from local, non-marine deposits.

Although both quartzite and fine-grained quartzite are dense intractile materials in comparison to CCS, they were separated from each other because of their different fracturing characteristics. Quartzite has tabular fracture patterns because of the prominent bedding planes while fine-grained quartzite has a greater tendency for conchoidal fracturing. Basalt has a tendency to fracture conchoidally, which increases as grain size decreases. Fine-grained basalt has been distinguished from other basalt because of its superior flaking qualities. Granitic materials include all crystalline siliceous rocks, coarse- and fine-grained. Fracture in granitic materials is generally not conchoidal and does not produce thin edges, except in the most fine-grained materials. The coarse-grained varieties may be friable. Steatite is a soft, fibrous rock which tends to fracture into irregular or tabular pieces. Siltstone/mudstone is a soft, fine-grained poorly consolidated sedimentary rock. It may break conchoidally, but its softness and friability limit its usefulness. Silicized mudstone, a fine-grained sedimentary rock with a siliceous cement, is softer and more granular than CCS, basalt, and quartzite, but nonetheless fractures conchoidally. The fractures are not as clean as those of CCS, with the result that the flake scars are not as sharp and the edges are more rounded. Argillite is a fine-grained metamorphic rock which may display either platy or conchoidal fracturing. Schist and shale have a platy structure and fracture in tabular pieces.

Not all of these material distinctions can be made with equal confidence. The dark fine-grained rocks--basalt, argillite, and silicized mudstone--are particularly difficult to segregate. Jasper and opal overlap somewhat in appearance. Opal may occur as a hydration rind on jasper, and the two materials may co-occur on a single object. Material may also be difficult to distinguish on cobble tools which do not have fractured surfaces. Materials which could not be identified lithologically are placed in the indeterminate category.

Most of the materials present at the sites can be found in the project area. The Columbia River gravels, exposed extensively along the shoreline near the sites and throughout the project area, are lithologically diverse. Subangular to rounded cobbles of basalt, quartzite and granitic materials are common, while fine-grained quartzite and schist occur less commonly. Cobbles of chert derived from marine sedimentary formations in the Canadian Belt series may also occur. Angular to subangular slabs of basalt and granitic materials weather out from bedrock exposures along the valley walls. Whether fine-grained basalt has a different source from other basalt is unknown. Jasper, chalcedony, and opal line veins and cavities in the basalt rimrock, and in the interbed formations. A local source of steatite occurs in the Bridge Creek drainage, on the east side of the Sanpoil River Valley (Larry Fredin, personal communication). Natural siltstone/mudstone concretions occur in the Nespelem silt formation.

Four materials have no known source in the project area--obsidian, petrified wood, argillite, and shale. Although there are reports of small placer sources of obsidian in Washington (such as in the Yakima Valley, Dave Rice, personal communication), the nearest large sources are to the north in British Columbia, to the east in Idaho, and to the south in Oregon. Obsidian occurs in small amounts in most sites in the Northwest, indicating that it was widely transported or traded throughout the area during prehistoric times. Petrified wood occurs in various locations on the Columbia Plateau. The closest sources of argillite are in northeastern Washington. As these formations are upstream in the Columbia River drainage, argillite may be found in small quantities in Columbia River gravel deposits in the project area. The nearest source of shale is not known.

DEFINITION OF LITHIC INDUSTRIES

Four industries are recognized at 45-OK-2 and 45-OK-2A. The most complex of these is a bifacial reduction system applied to materials with pronounced, consistent conchoidal fracturing. A number of specialized flaking by-products characterize the various stages of reduction, and the outputs include diverse formed tools characterized by small size and low mass, with points and specialized edges. The second system involves primary reduction of cobbles of dense, intractable materials to produce large, heavy flakes which are utilized with little additional modification. The third industry, in which cobbles and slabs are selected and minimally modified for use as core tools, is the least complex. In the fourth industry, which is more similar to the manufacture of bone and antler tools than to other lithic industries, soft lithic materials are worked with abrasive reduction techniques.

Bifacial Reduction

From previous models of sequential reduction of conchoidally fracturing material (Holmes 1919; Sharrock 1966; Muto 1971; Womack 1977; Callahan 1979), Miss (1984a,b,c,d) has developed a generalized model for application to other sites in the project area (Figure 3-1). Raw materials are acquired and

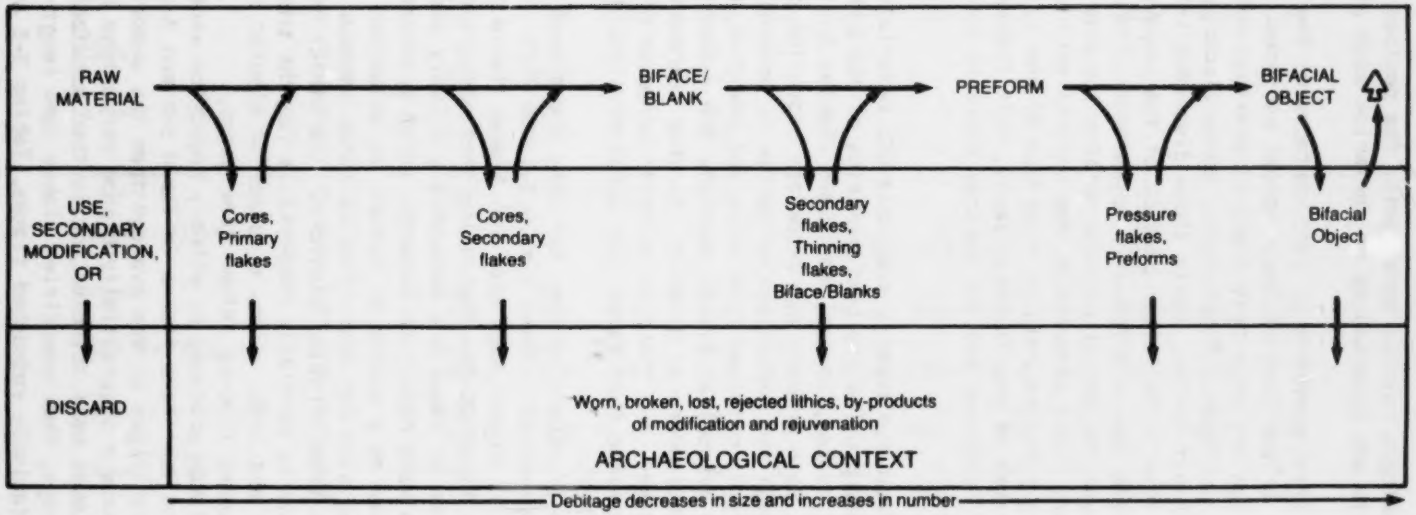
RAW MATERIAL
BIFACE/ BLANK
PREFORM
BIFACIAL OBJECT
USE, SECONDARY MODIFICATION, OR
Cores, Primary flakes
Cores, Secondary flakes
Secondary flakes, Thinning flakes, Biface/Blanks
Pressure flakes, Preforms
Bifacial Object
DISCARD
Worn, broken, lost, rejected lithics, by-products of modification and rejuvenation
ARCHAEOLOGICAL CONTEXT
Debitage decreases in size and increases in number

Figure 3-1. Schematic of the bifacial reduction process (from Miss 1984d).

reduced into increasingly refined forms until the desired product is reached, and specific products and by-products characterize each stage.

> Primary flakes show weathered or rind surfaces of the original exterior on all or portions of their dorsal surfaces. Secondary flakes lack cortex and show only scars of previous detached flakes on their dorsal surfaces. Predictably, cores discarded earlier in the sequence exhibit cortex, while those discarded later do not. Flakes removed toward the latter portion of the sequence as bifaces are formed have a diagnostic appearance. They may be recognized because the dorsal surface retains the scars from earlier secondary flake detachment, the ventral surface is smooth, and the striking platform retains a portion of the biface edge. In the final stages of manufacture, small, thin flakes are removed by the pressure technique and the desired tools is formed (Miss 1984d:53).

Objects made from the locally available CCS materials, jasper, chalcedony, and opal, provide the best examples of the bifacial reduction system. Conchoidal flakes, chunks, and cores (Tables 3-1 and 3-2), represent initial reduction. Both primary and secondary reduction products occur (Table 3-3 and 3-4), although the percentage of cortex is unusually low because the raw material is largely obtained from veins and cavities and does not have cortex. Unmodified conchoidal flakes dominate the assemblage. Blades were recorded only for chalcedony at 45-OK-2. As they represent such a low frequency of all flakes, and there is no other evidence of systematic blade production, it is assumed that these long parallel-sided flakes were produced in flaking by accident.

The percentage of chunks varies, but they are always the most abundant object type after conchoidal flakes (Table 3-1 and 3-2). The percentage of chunks with cortex is higher than that for flakes (Table 3-3 and 3-4)--except in the case of opal at 45-OK-2A--indicating that they have been subjected to less reduction. Some of these are undoubtedly primary decortication products or shatter from the same reduction sequence which produced the flakes. Other chunks have been used as a source of flakes, as evidenced by negative flake scars; however, they were not classified as cores because they do not have two flake scars off the same striking platform. The strict definition of cores used in this analysis is partially responsible for the small number of cores recorded (Table 3-1 and 3-2). Also, a number of bipolar cores were classified as bifacially retouched flakes, rather than cores.

Some of the flakes produced by primary reduction were utilized without further modification (utilized flakes in Table 3-1 and 3-2). The flakes selected for use are larger on the average than the unmodified flakes (Table 3-5 and 3-6), and have a substantially higher percentage of cortex (Table 3-3 and 3-4). Other flakes were selected for further manufacture. These are larger, on the average, than unmodified flakes (see length measurements of bifacially and unifacially retouched flakes, Tables 3-5 and 3-6). The percentages of cortex, however, are comparable to those of unmodified flakes

Table 3-3. Percentage of objects with dorsal cortex, by material, 45-OK-2.

Object Type	Statistic[1]	Jasper	Chalcedony	Petrified Wood	Opal	Obsidian	Quartzite	Fine-Grained Quartzite	Basalt	Fine-Grained Basalt	Granitic Materials	Silicized Mudstone	Argillite
Conchoidal Flake	N	16,283	9,837	500	9,193	100	131	29	218	431	14	166	10
	%	1.6	1.0	0.6	1.3	0.0	34.4	27.6	8.3	1.2	35.7	0.0	0.0
Core	N	5	5	-	7	-	-	-	-	-	-	-	-
	%	20.0	20.0		14.3								
Linear Flake	N	14	28	-	4	-	-	-	-	-	-	-	-
	%	0.0	0.0		0.0								
Resharpening Flake	N	11	16	3	6	-	-	-	-	-	-	-	-
	%	0.0	0.0	0.0	14.3								
Tabular Flake	N	-	-	1	-	-	9,871	6	1	-	-	-	-
	%			0.0			18.3	66.7	100.0				
Chunk	N	1,623	411	61	1,199	5	758	3	6	4	3	4	10
	%	6.8	5.1	4.9	8.6	40.0	48.5	33.3	66.7	0.0	100.0	0.0	0.0
Utilized Flakes	N	383	216	18	191	2	2	1	1	1	3	1	-
	%	6.8	3.2	0.0	4.7	0.0	50.0	0.0	100.0	0.0	33.3	0.0	
Retouched Flakes[2]	N	448	164	45	183	-	9	1	5	2	-	6	1
	%	6.5	6.1	11.1	4.9		44.4	100.0	0.0	0.0		16.7	0.0
Shaped Flake Tools[3]	N	188	77	13	69	2	336	2	5	6	5	1	5
	%	1.6	2.6	0.0	2.9	0.0	57.1	50.0	40.0	16.7	20.0	0.0	0.0
Total		18,956	10,754	641	10,852	109	11,107	42	236	444	25	178	26

[1] N = Total number for which cortex information is available.
% = Percent of objects with complete or partial dorsal cortex.

[2] Includes bifacially and unifacially retouched flakes and bifaces.

[3] Includes projectile points, burins, drills, gravers, scrapers, and tabular knives.

(Table 3-3 and 3-4). The simplest type of modification is unifacial or bifacial retouching in a limited area to produce a specialized edge on an otherwise unshaped flake, examples of which are included in the bifacially and unifacially retouched flake categories. The drill, graver, and scraper categories all include some examples on which only the working end is shaped and the distal end left unmodified. Others include varying amounts of shaping of the distal end, but most seem to have been made on flakes, and not on blanks. The biface/blank and preform stages were apparently used only for manufacturing projectile points, which require a high degree of symmetry and carefully controlled cross-section, and perhaps for hafted drills. Bifaces are represented in the biface category and the unnotched triangular forms included in the projectile points are preforms.

Table 3-4. Percentage of objects with dorsal cortex, by material, 45-OK-2A.

Object Type	Statistic[1]	Jasper	Chalcedony	Opal	Obsidian	Quartzite	Fine-Grained Quartzite	Basalt	Silicized Mudstone	Argillite
Conchoidal Flake	N	1,510	412	51	-	-	2	3	2	2
	%	0.7	1.2	0.0			0.0	33.3	0.0	0.0
Linear Flake	N	1	3	-	-	-	-	-	-	-
	%	0.0	0.0							
Resharpening Flake	N	-	-	-	1	-	-	-	-	-
	%				0.0					
Tabular Flake	N	-	-	-	-	140	-	-	-	-
	%					22.9				
Chunk	N	194	37	8	-	39	-	-	-	-
	%	4.6	2.7	0.0		35.9				
Utilized Flakes	N	28	11	1	-	-	-	-	-	-
	%	3.6	9.1	0.0						
Retouched Flakes[2]	N	22	7	1	-	-	-	-	-	-
	%	0.0	0.0	0.0						
Shaped Flake Tools[3]	N	26	4	1	-	13	1	-	-	-
	%	3.8	0.0	0.0		61.5	100.0			
Total		15,371	474	62	1	192	3	3	2	2

[1] N = Total number objects for which cortex information is available.
% = Percent of objects with complete or partial dorsal cortex.

[2] Retouched Flakes includes unifacially and bifacially retouched flakes and bifaces.

[3] Shaped Flake Tools includes projectile points, drills, gravers, scrapers, spokeshaves, and tabular knives.

Table 3-5. Average lengths (in .1 cm) of flaking products by object type and material, 45-OK-2.

Object Type	Statistic	Jasper	Chalcedony	Petrified Wood	Opal	Obsidian	Quartzite	Fine-Grained Quartzite	Basalt	Fine-Grained Basalt	Granitic Materials	Siltstone/ Mudstone	Argillite
Conchoidal Flake	$\bar{x}$	10.9	10.8	11.1	11.0	11.1	17.3	14.6	14.0	11.4	41.2	12.9	10.7
	s.d.	3.3	2.9	3.9	3.6	2.9	11.8	9.2	8.9	3.4	39.2	5.4	3.0
	N	9,975	6,304	285	5,705	66	120	19	149	256	11	94	4
Blade	$\bar{x}$		20.5										
	s.d.	-	3.5	-	-	-	-	-	-	-	-	-	-
	N		2										
Linear Flake	$\bar{x}$	10.5	9.6		10.0								
	s.d.	2.5	2.7	-	1.4	-	-	-	-	-	-	-	-
	N	10	16		2								
Resharpening Flake	$\bar{x}$	17.5	7.5	6.0	9.0								
	s.d.	12.0	2.4	-	1.4	-	-	-	-	-	-	-	-
	N	2	4	1	2								
Core	$\bar{x}$	26.8	25.8		27.3								
	s.d.	10.7	3.3	-	8.9	-	-	-	-	-	-	-	-
	N	5	5		6								
Tabular Flake[1]	$\bar{x}$						19.3		162.0				
	s.d.	-	-	-	-	-	22.1	-	-	-	-	-	-
	N						43		1				
Chunk	$\bar{x}$	15.8	15.5	18.0	17.6		27.3	19.0	46.0		67.3		
	s.d.	8.4	6.8	5.3	9.2	-	19.0	-	31.8	-	60.4	-	-
	N	176	26	3	142		377	1	4		3		
Utilized Flake	$\bar{x}$	17.6	13.9	20.1	15.1	8.0					99.0	29.0	
	s.d.	10.7	6.8	10.5	7.3	1.4	-	-	-	-		15.6	-
	N	191	108	11	112	2					1	2	
Bifacially Retouched Flake	$\bar{x}$	22.2	17.7	27.7	23.2							25.0	
	s.d.	11.3	4.6	14.5	7.9	-	-	-	-	-	-	-	-
	N	18	4	3	8							1	
Unifacially Retouched Flake	$\bar{x}$	21.2	18.0	21.5	17.1		44.0	71.0				35.0	
	s.d.	8.8	7.0	12.4	9.2	-	8.5	-	-	-	-	-	-
	N	57	26	4	27		2	1				1	
Total		10,434	6,495	307	6,004	68	542	21	154	256	15	98	4

---

[1] Length was measured only on selected tabular flakes.

Table 3-6. Average lengths (.1 cm) of flaking products by object type and material, 45-OK-2A.

Object Type	Statistic	Jasper	Chalcedony	Opal	Obsidian	Quartzite	Basalt	Granitic Materials	Siltstone/ Mudstone	Argillite
Conchoidal Flake	$\bar{x}$	11.0	11.5	10.7			23.7	15.0	12.5	10.0
	s.d.	3.3	3.5	3.2	-	-	15.8	-	3.5	0.0
	N	871	288	36			3	1	2	2
Linear Flake	$\bar{x}$		10.3							
	s.d.	-	2.3	-	-	-	-	-	-	-
	N		3							
Resharpening Flake	$\bar{x}$				15.0					
	s.d.	-	-	-	-	-	-	-	-	-
	N				1					
Chunk	$\bar{x}$	19.5	9.0			26.6				
	s.d.	14.5	-	-	-	15.6	-	-	-	-
	N	11	1			14				
Utilized Flake	$\bar{x}$	20.1	21.2	27.0						
	s.d.	7.8	3.7	-	-	-	-	-	-	-
	N	10	6	1						
Unifacially Retouched Flake	$\bar{x}$	24.0	21.0	27.0						
	s.d.	7.1	-	-	-	-	-	-	-	-
	N	2	1	1						

In addition to the finished tools, a number of other objects testify to these later stages of manufacture. The linear flakes (Tables 3-1 and 3-2), small parallel-sided flakes, are probably debitage from pressure flaking in the final stages of manufacture. The flakes < 1/4 in are indicative of the activities of shaping tools. Resharpening flakes, which have wear on the striking platform, result from rejuvenation of tools. The biface and bifacially and unifacially retouched flake categories include incompletely manufactured forms and fragments discarded during the manufacturing process because of breakage, as well as complete and broken tools.

Although all of the locally available CCS materials are very similar in terms of object types and flake characteristics, there are differences. Chalcedony is distinctive in having the highest percentage of conchoidal flakes, and the lowest percentages of chunks and formed objects Table 3-1 and 3-2). The frequency of cortex on flakes and chunks is also lower than for jasper and opal (Table 3-3 and 3-4). In the 45-OK-2 assemblage, the chalcedony flakes are the smallest, having the lowest average values for length, width, thickness, and weight (Table 3-7). This is not true at 45-OK-2A (Table 3-8). A possible explanation is that chalcedony was available in smaller pieces than the other materials and when worked yielded smaller flakes, and thus fewer suitable for utilization or further manufacture. This does not explain the lower percentage of chunks, however.

Table 3-7. Average measurements of conchoidal flakes by material, 45-OK-2.

Measurement	Statistic	Jasper	Chalcedony	Petrified Wood	Opal	Obsidian	Quartzite	Fine-Grained Quartzite	Basalt	Fine-Grained Basalt	Granitic Materials	Silicized Mudstone	Argillite
Length (.1 cm)	$\bar{x}$	10.9	10.6	11.1	11.0	11.1	17.3	14.6	14.0	11.4	41.2	12.9	10.7
	s.d.	3.3	2.9	3.9	3.9	2.9	11.8	9.2	8.9	3.4	39.2	5.4	3.0
	N	9,975	6,304	285	5,705	66	120	19	149	256	11	94	4
Width (.1 cm)	$\bar{x}$	10.4	8.5	14.7	10.3	9.0	21.3	15.8	32.1	11.6	70.6	30.0	12.0
	s.d.	6.3	4.6	8.2	5.3	–	14.3	8.2	15.2	6.5	70.4	–	–
	N	281	153	4	157	1	44	5	14	5	5	1	1
Thickness (mm)	$\bar{x}$	20.6	17.5	37.7	27.6	10.0	42.2	34.7	63.6	18.3	136.4	73.0	18.0
	s.d.	15.3	16.8	22.2	22.7	–	31.8	19.5	52.2	8.8	205.0	–	–
	N	344	191	6	217	1	48	7	18	7	5	1	1
Weight (.1 gm)	$\bar{x}$	4.6	2.8	13.8	4.2	1.0	42.7	26.7	91.0	14.1	3,069.8	29.5	2.0
	s.d.	11.2	5.3	19.9	8.5	–	70.9	43.1	153.9	31.3	6,681.8	30.4	–
	N	590	291	10	325	2	49	8	21	7	5	2	1
Total		11,190	6,939	305	6,404	70	261	39	202	275	26	98	7

[1] Includes only unmodified conchoidal flakes.

Table 3-8. Average measurements of conchoidal flakes[1] by material, 45-OK-2A.

Measurement	Statistic	Jasper	Chalcedony	Opal	Basalt	Granitic Materials	Silicized Mudstone	Argillite
Length	$\bar{x}$	11.0	11.5	10.7	23.7	15.0	12.5	10.0
(.1 cm)	s.d.	3.3	3.5	3.2	15.8	–	3.5	0.0
	N	871	288	36	3	1	2	2
Width	$\bar{x}$	14.0	6.2		55.0			
(.1 cm)	s.d.	8.8	1.3	–	–	–	–	–
	N	7	4		1			
Thickness	$\bar{x}$	34.4	15.7		68.0			
(mm)	s.d.	25.3	3.6	–	–	–	–	–
	N	7	4		1			
Weight	$\bar{x}$	7.8	1.7		86.0			
(.1 gm)	s.d.	11.6	1.2	–	–	–	–	–
	N	12	6		1			
Total		887	302	36	6	1	2	2

[1] Includes only unmodified conchoidal flakes.

Jasper and opal are more similar to each other than either is to chalcedony. Jasper has a somewhat lower percentage of conchoidal flakes and higher percentage of chunks than opal, but they are more similar to each other in the proportions of these categories than to chalcedony (Tables 3-1 and 3-2). At 45-OK-2, jasper and opal both have a higher proportion of secondary flakes and chunks than chalcedony (Table 3-3), although the same is not true at 45-OK-2A (Table 3-4). The flakes of jasper and opal are quite similar in size (Tables 3-7 and 3-8). Although the opal flakes are slightly longer and thicker on the average, they weigh somewhat less that jasper flakes. Although they are slightly narrower, it seems unlikely that they comprise less volume. The difference in average weight may be due to the lower specific gravity of opal.

The smaller assemblages of petrified wood, obsidian, and argillite, include finished products, such as projectile points, typical of the reduction sequence described for locally available CCS materials. However, many specialized flake categories are lacking, and the overall proportions of debitage and formed tools are somewhat different. The differences may be accounted for by the fact that the materials are imported. It is commonly assumed that imported lithic materials were transported in a partially or completely reduced form to save weight. At its final destination, a rare imported material would be carefully husbanded and used only for purposes to which it was particularly suited. Thus we expect less reduction debitage, a higher proportion of worn and manufactured items, and more evidence of re-use and rejuvenation than for locally available material.

Petrified wood conforms to our expectations: it has a considerably lower percentage of conchoidal flakes, and higher percentage of formed objects than other CCS materials (Table 3-1). The relative percentage of debitage is lower in spite of the higher proportion of chunks, the latter undoubtedly due to the increased tendency to tabular fracturing. This, and the higher percentage of formed objects suggest its conservative use, as would be expected of an imported material. The lower frequency of cortex on flakes and chunks (Table 3-3) may be due to the material being reduced more off-site, or to a form of occurrence having less cortex per volume. Although only slightly longer than the other CCS flakes, petrified wood flakes are wider, thicker and heavier, on the average, than the other CCS flakes (Table 3-7). This may be due to the effect of the silicified wood structure on fracturing.

A comparison of obsidian with the other CCS materials is surprising: it resembles the local CCS materials more than the petrified wood. The percentage of conchoidal flakes at 45-OK-2 (91.8%) is higher than that for materials (88.4-93.9%) (Table 3-1). The chunk percentage is closest to chalcedony, which has the lowest percentage (4.2%) of the CCS materials. One obsidian flake has partial cortex on the dorsal surface; the others have none (Table 3-3). The average length of unmodified obsidian flakes is 1.1 cm (Table 3-7), the same as that of petrified wood, and slightly longer than the locally available CCS materials except for chalcedony at 45-OK-2A (Table 3-8). There are too few width, thickness and weight measurements for comparison with CCS flakes. None of the chunks exhibit cortex.

Shaped and worn objects, including a projectile point, an obliquely fractured projectile point tip, and two utilized flakes, make up 3.6% of the obsidian assemblage at 45-OK-2 (Table 3-1). This percentage conforms to the expectations stated above, as it is higher than that of any of the locally available materials at 45-OK-2 (1.6-2.4%); it is lower, however, than that of petrified wood (6.9%). (Shaped and worn objects form a higher proportion of jasper, chalcedony, and opal objects at 45-OK-2A (4.5-4.8%, Table 3-2). However the sample sizes are much lower.) The utilized obsidian flakes are shorter, on the average, than the unmodified flakes, although they are as wide and thicker. They may actually be resharpening flakes or fragments of larger utilized or manufactured fragments. The shaped objects (not shown in Table 3-5) are considerably larger than the other items.

The occurrence of a secondary flake, and the high frequency of debitage which cannot be definitely ascribed to final manufacturing stages, use, breakage, or reworking is unexpected. They suggest that obsidian was transported in a less reduced form than assumed above. The sample size is small, however, and so the representation of forms may be biased; these results do not necessarily challenge our assumptions about the form in which the raw material is introduced to the site and how it is used.

The argillite assemblage conforms well to our expectations for imported materials. The two argillite artifacts from 45-OK-2A, and 10 of the 15 from 45-OK-2, are unmodified tertiary conchoidal flakes, similar in size to CCS flakes (Tables 3-1 and 3-2). The five remaining examples of argillite at 45-OK-2 include four projectile points and one biface--the highest percentage of shaped items of any of the flaked materials.

The silicized mudstone assemblage at 45-OK-2 includes conchoidal flakes, chunks, and worn or manufactured flakes (Table 3-1). The debitage and utilized products are very similar to those noted for CCS, implying similar reduction techniques. The average flake size, however, is slightly larger than that of any of the CCS materials.

Cobble Reduction and Cobble Tool Manufacture

Miss (1984) has modeled a cobble reduction process as a separate lithic industry (Figure 3-2).

> The second system of reduction is similar to the first except that large flakes derived from locally available cobbles and the modified cobbles themselves are the desired products. Since it represents an 'indulgent' system based on readily available resources (MacDonald 1971), extensive modification and reuse of the products in this system is less likely to occur (Miss 1984d:53).

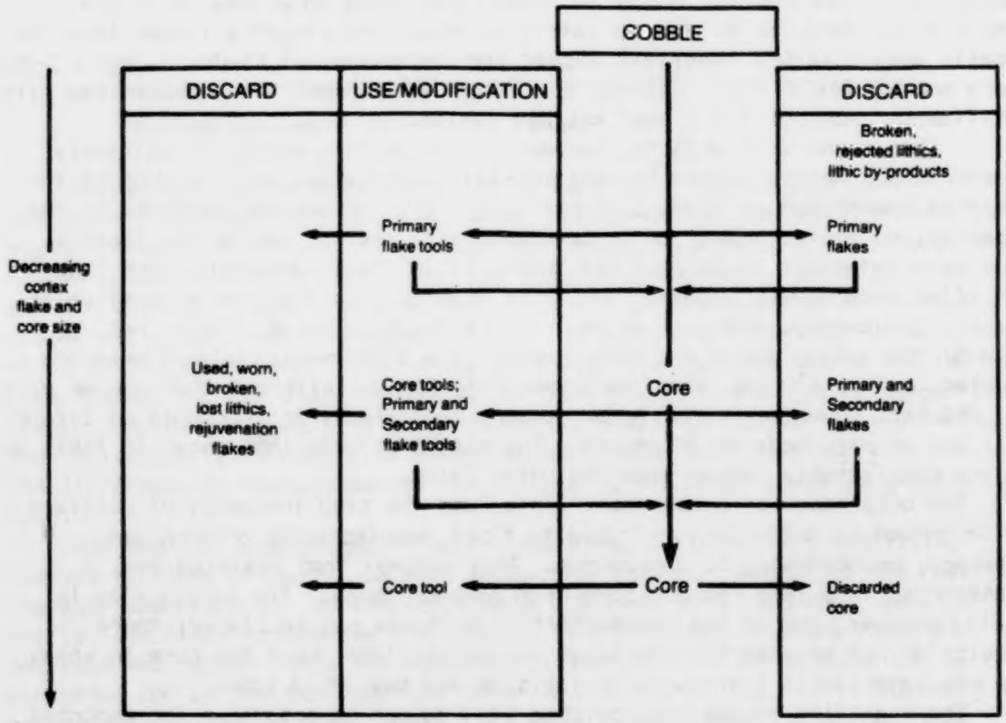
COBBLE
DISCARD
USE/MODIFICATION
DISCARD
Broken, rejected lithics, lithic by-products
Primary flake tools
Primary flakes
Decreasing cortex flake and core size
Used, worn, broken, lost lithics, rejuvenation flakes
Core tools; Primary and Secondary flake tools
Core
Primary and Secondary flakes
Core tool
Core
Discarded core

Figure 3-2. Schematic of the cobble reduction process (from Miss 1984d).

In this consideration we will distinguish between the reduction of cobbles for flakes, which we will term the cobble reduction process, and the use of cobbles themselves as tools, which we will call the cobble selection process. The former involves the flaking of cobbles of dense intractile materials to produce large, heavy flakes which were used with little further modification. Although it overlaps, the selection and manufacture of cobble tools may be considered as a distinct process. The granite assemblage, used extensively for cobble tools, but not reduced for flakes, provides the best argument for the independence of the industries. For both edged and non-edged cobble tools, raw material forms were selected which minimized the amount of modification required. Appropriately shaped cobbles were used without modification as hammerstones, anvils, milling stones, and hopper mortar bases. Large flat cobbles were selected for the stationary tools, anvils, milling stones, and hopper mortar bases, in which mass and a surface are the important traits. Smaller subangular to rounded cobbles were selected for hammerstones, which are moved in use. Such non-edged tools as net weights and sometimes pestles were more likely to be modified, primarily by pecking. Some of the choppers are natural spalls with sharp edges, selected and used with little flaking. The cobbles selected for edged tools range in shape from rounded to subangular to discoidal. Thus there are two outputs, finished tools and waste flakes. The waste flakes cannot be distinguished in this analysis from flakes produced deliberately for use as flakes.

Quartzite is the principal material used in the cobble reduction industry. Tabular flakes dominate the quartzite assemblages at both sites, making up 88.7% of the assemblage at 45-OK-2 (Table 3-1) and 71.8% at 45-OK-2A (Table 3-2). The frequency of cortex on tabular flakes is quite high (Tables 3-3 and 3-4). The only measurement taken on tabular flakes was thickness (Tables 3-5 and 3-6); however, observation indicates that they vary widely in size from small fragments less than 1 cm long to large fragments about 10 cm long. Chunks are the next most common type of quartzite debitage, constituting over 6% at 45-OK-2 and 20% at 45-OK-2A, thus raising the percentage of nonconchoidal debitage at both sites to over 90%. The frequency of chunks with partial cortex is high, ranging from 45-55%. Conchoidal flakes are absent from 45-OK-2A and occur in low frequencies (1.2%) at 45-OK-2. These are much larger than those of any material worked in the bifacial reduction process (Table 3-7 and 3-8) and have a higher percentage of cortex (Table 3-3 and 3-4). Tabular knives--tabular flakes bifacially retouched to create a long convex bifacial edge--are the most abundant type of worn or manufactured object at 45-OK-2 (3.0%) and the only type of worn or manufactured quartzite flake at 45-OK-2A. Only a small number of flakes at 45-OK-2 were modified in any other manner.

Many quartzite tabular flakes have cortex on the lateral margins and appear to be cross sections of cobbles. These undoubtedly were produced by splitting rounded quartzite cobbles with the hammer and anvil technique. This resulted in tabular fragments rather than classic bipolar flakes because of quartzite's strong bedding planes. Chunks also are expected to be common among debitage resulting from bipolar cobble splitting. The general abundance of tabular flakes and chunks and the rarity of conchoidal flakes and cores indicate that bipolar flaking was the dominant reduction method in the quartzite industry, although free percussion was probably also used. Both methods may have resulted in tabular flakes with occasional conchoidal flakes produced by chance. Judging from the relative frequencies of the worn and manufactured object types, the primary purpose of splitting quartzite cobbles was to produce large, thin flakes with convex edges suitable for use as tabular knives.

Quartzite cobbles also were used without modification as hammerstones, or flaked to form choppers. Possibly some of the conchoidal flakes are by-products of flaking cobbles to make choppers. Such tools were manufactured by the removal of a limited number of flakes from one or both sides, which would produce a high proportion of flakes with at least partial dorsal cortex. The amorphously flaked cobbles at 45-OK-2 may be cores or discarded attempts at chopper production.

Fine-grained quartzite is less common than other quartzite, with a sample size of 44 at 45-OK-2 (Table 3-1) and none at 45-OK-2A. It is worked into the same kinds of products as other quartzite -- conchoidal and nonconchoidal fragments, worn and manufactured flakes, flaked cobbles tools, and other cobble tools--but the proportions differ. Conchoidal flakes are more common, averaging 65.9% for the entire assemblage as opposed to 1.2% for other quartzite, and tabular flakes are less common, averaging 13.6% as opposed to 88.7%. The frequency of partial and complete dorsal cortex is lower on fine-grained quartzite flakes and chunks than on quartzite (Table 3-3). The fine-grained quartzite flakes are shorter, thinner, and weigh less than the quartzite flakes, on the average, although sample sizes are low (Table 3-7).

This assemblage provides no evidence that fine-grained quartzite played a different technological role than quartzite. The fine-grained quartzite assemblage resembles the CCS assemblages in the dominance of conchoidal flakes but in other respects is more similar to quartzite. Cobbles of both materials were collected and used either for cobble tools or the manufacture of flakes. The occurrence of tabular flakes is a trait shared by both types of quartzite and not by CCS. Quartzite and fine-grained quartzite flakes differ in average measurements, but are more similar to each other than to the CCS materials (Table 3-7). Both types of material were probably reduced in the same way--the higher proportion of conchoidal flakes and lower proportion of tabular flakes in fine-grained quartzite simply result from its differing fracturing characteristics. At any rate, the goals of reduction seem to have been the same. Regardless of the grain size, the quartzite flakes are more massive and rugged than the CCS flakes, and are used almost exclusively for making tabular knives. This contrasts with CCS flakes, which are worked into a variety of finely shaped pointed tools. Fine-grained quartzite should probably be considered an extreme variation of the material type, used in the same industry. This is consistent with the rarity of the material--there is only one fine-grained quartzite artifact for every 252 quartzite artifacts.

Cobble tools dominate the assemblage of granitic materials. Some cobbles were flaked to create an edge--choppers and amorphously flaked cobbles account for 9.1% of the total at 45-OK-2 (Table 3-1). Cobble tools without flaked edges are more common (36.4%). Most of these are modified by use, and rarely by manufacture. Pestles, shaped by either pecking or chipping, are the exception. The remainder of the assemblage is made up of conchoidal flakes, chunks, and tabular knives. One third of the granitic flakes exhibit partial cortex on the dorsal surface (Table 3-3) and they are larger, on the average, than either the basalt or quartzite flakes (Table 3-7). The tabular knives are made on objects which may be natural spalls. A quarter of these have partial dorsal cortex (Table 3-3). The paucity of flakes, both unmodified and modified, suggests that granite was not deliberately reduced for flake production. Some flakes may be incidental by-products of cobble tool manufacture and others natural spalls. Since we have no evidence that granitic cobbles were systematically reduced, we do not believe the chunks are artifacts. The 45-OK-2A assemblage, consisting of a conchoidal flake, a tabular knife, and a chopper, offers no additional information on technology.

The small schist assemblage suggests occasional opportunistic use of schist cobbles. The six schist objects found at 45-OK-2 (Table 3-1) include three forms: a chunk, tabular flakes, and one extensively manufactured object, a long thin piece bifacially flaked on all sides to form a rectangular object with slightly excurvate edges. The chunk is a large unmodified piece of platy micaceous schist with an oxidized surface, while the tabular flakes are large and thick. Neither form relates to the manufacturing sequence which resulted in the shaped object, and they are not necessarily even artifacts.

Basalt is the most diversely used material in the assemblage, with object types attributable to all four of the lithic industries present at the sites. Basalt projectile points and bifaces indicate that it was sometimes worked in a sequential reduction system. The large worn flakes and tabular knives, on the other hand, resemble products of the primary reduction system described for quartzite. Basalt cobble tools and ground stone objects indicate that basalt was utilized in the other two industries as well. Not all of the basalt artifacts can be assigned to one or another of the lithic industries, as the products are not mutually exclusive.

Basalt and fine-grained basalt resemble the CCS assemblages in that the most abundant artifacts are conchoidal flakes, accounting for 65% of the assemblage at 45-OK-2 (Table 3-1) and 37.5% at 45-OK-2A (Table 3-2). Cortex occurs on 8.3% of the flakes at 45-OK-2 (Table 3-3) and 33.3% at 45-OK-2A (Table 3-4), a higher value than any of the CCS materials. This difference may be simply due to the fact that basalt was obtained in cobble form, while the CCS materials were obtained in a relatively cortex-free form. The basalt flakes are, on the average, longer, and substantially wider and thicker than the fine-grained basalt flakes (Table 3-7). The average length and weight of fine-grained basalt flakes is slightly greater than the CCS flakes, while width and thickness fall within the CCS range (Table 3-7). Basalt flakes are probably produced in two ways, as by-products in the manufacture of cobble choppers and by deliberate reduction of cores to produce flakes. These two products cannot be separated on the basis of the available data. Other debitage includes a single tabular flake and a few chunks.

One utilized flake each of basalt and fine-grained basalt occur at 45-OK-2 (Table 3-1) indicating selection of flakes for use without further modification. The products of later stages in the bifacial reduction system--

unifacially retouched flakes, bifaces, projectile points and fragments--are more common. Overall, fine-grained basalt has a higher proportion of worn and manufactured flakes (11.9%) than other basalt (3.3%). Fewer types of flaked objects were made of basalt than of CCS materials which may indicate that it is less versatile as a flaking material, although larger sample sizes would be required for a conclusive comparison.

Basalt cobbles commonly were flaked to create choppers--6.8% of the 45-OK-2 assemblage (Table 3-1) and 1.0% of the 45-OK-2A assemblage (Table 3-2). A cobble with a pecked depression on one side was classified as a net weight. The pestle from 45-OK-2A was shaped by pecking. Other cobbles were used without modification as anvils, hammerstones, and milling stones (totalling over 10% of the 45-OK-2 assemblage. Modification on the edge-ground cobble may be a combination of manufacture and wear or may be entirely wear.

The separation of basalt and fine-grained basalt is of doubtful technological significance in this assemblage. No doubt textural variation in basalt forms a continuum, and the tendency to fracture conchoidally varies accordingly. The artisans may have "tried out" basalt cobbles and abandoned those which did not flake, using only the better materials in the sequential reduction system. Our separation of fine-grained and other basalt approximates, but does not coincide exactly with, this distinction. That the basalt flakes are considerably heavier and larger, and have a higher percentage of cortex, than the fine-grained basalt flakes suggests a significant technological distinction. There are, however, formed objects of the coarser basalt, so industries are not completely separated by the segregation of these material types. We can offer two explanations for the higher proportion of cortex on basalt than on fine-grained basalt. More flakes may be produced from a single core of fine-grained basalt than other basalt, resulting in a lower ratio of decortication flakes to other flakes; or the flakes with cortex among the basalt flakes may be produced largely by the manufacture of cobble tools rather than by the systematic bifacial flaking of basalt cores. These explanations cannot be tested with the available data.

Abrasion Reduction

The fourth lithic industry involves reduction and shaping of softer lithic materials. Because abrasive reduction techniques such as incising, drilling, and grinding are used, it has more in common with the manufacture of bone, antler, and shell artifacts than with other lithic manufacturing systems.

The 23 steatite objects from 45-OK-2 (Table 3-1) all found within Housepit 6, provide the best evidence of a distinct ground stone industry. The 20 tabular flakes, so similar in color and texture that they appear to come from a single source, were limited to five contiguous quads. Although these thin, irregular fragments lack evidence of systematic reduction such as grooving, it seems likely that they are debitage from the manufacture of the formed objects. They are more scattered than would be expected if they were portions of a single piece broken after deposition. Three other items, tabular fragments that resemble the others in color and texture but are modified by grinding, were found in scattered locations within Housepit 6. One has a single ground surface with a few random incisions and signs of incising and snapping on one edge. The other two have been ground on the edges and flat surfaces to form regular shapes. They are longer than any of the tabular flakes, but fall within the same range of thickness. One is a narrow rectangle, tapering to a blunt, asymmetrical point. The other is a pendant, a tapering rectangle with a biconical hole drilled at the slightly narrower end (see stylistic section for a more complete description). Parallel striae are visible on the edges and surfaces of both of these formed objects. Experimental abrasion of steatite with Equisetum stalks produced striae with similar depth and spacing. Ethnographers have recorded this method of working soft materials such as steatite and bone among local peoples (Turner et al. 1980:17-18). The representation of three stages of manufacture, the unmodified objects representing debitage or raw material, the partially ground but unshaped object, and the two finished objects, indicates that the steatite was being worked at the site.

The beads also were produced by a grinding reduction sequence. Some of the beads are identified as basalt, but the majority are a dark, fine-grained platy material which could not be identified (Table 3-1). A few of the beads in the indeterminate material category are of a light gray material which has been identified as calcite (in rock form, not shell) since the analysis was made. The bead blanks may have been prepared by a percussive reduction technique and grinding, which is a slower process, used only in the later stages. It appears that the artisan split the platy materials to the proper thickness and then finished the beads by drilling a hole and abrading the edges. The beads tend to be more polygonal than round. The edges must have been finished by stringing beads together and rubbing the entire string against a whetstone, rotating the beads only a few times. Lack of evidence of other stages of this sequence at the site suggests that the beads were brought to the site in finished form, although possibly we have not recognized the products of other stages.

Two objects of shale were recovered from 45-OK-2 (Table 3-1), a chunk and a utilized flake. Shale is a relatively soft material, and one would expect it to be worked primarily by abrasive techniques, but the small number of objects precludes technological interpretation.

The 70 objects of siltstone/mudstone recovered from 45-OK-2 (Table 3-1) are natural concretions or portions thereof. Their presence on the site is probably due to human transport rather than natural depositional processes: the siltstone concretions all occur at the east end of the site, farthest from the eroding cliffs of Nespelem silt at the west end (see Figure 2-1). However, we could not determine with any certainty whether they had been modified; consequently, they were recorded as indeterminate object types. A number have indentations or smooth spots on the surface resulting from attrition, but there is no convincing evidence of a human agent, especially in view of the material's soft surface.

COMPARISON AMONG ZONES

We have described four distinct lithic industries. The major lithic material types, CCS, quartzite, basalt, and granitic materials, were worked and used in specialized ways which reflect their availability and mechanical fracturing properties. In the following discussion we will show that, although material proportions changed systematically over the 4000 years of intermittent occupation at the site, the lithic industries themselves did not change. Changes in the relative frequency of CCS, quartzite, and basalt apparently reflect functional changes, that is changes in the demand for specific products of the lithic industries. Changes in the proportions of technologically equivalent materials such as jasper and chalcedony, on the other hand, probably reflect changing availability of materials through time and the substitution of one material for another.

Material Frequency

The frequency of materials by zone is shown for each site in Table 3-9. At 45-OK-2, the proportion of chalcedony tends to increase through time, while petrified wood remains nearly constant. Jasper and opal fluctuate but do not display a definite trend. The percentage of quartzite decreases through time, while fine-grained quartzite occurs in constant proportions. Fine-grained basalt decreases dramatically from Zone 4 to Zone 1 at 45-OK-2 but other basalt exhibits no trend. Obsidian, argillite, and granitic materials, each of which make up less than 1% of the assemblage at 45-OK-2, occur in generally constant proportions. Silicized mudstone percentages fluctuate randomly. Occurrences of schist and steatite at 45-OK-2 are limited to Zones 1 and 2, with the greatest abundance in Zone 1, and shale occurs only in Zone 1. Siltstone/mudstone has an unusual distribution at 45-OK-2, occurring in all zones, but with substantially higher frequencies in Zone 3. Of the Zone 3 concretions, 50 were found in three units excavated in Surface Depression G. The disparity among the zones probably results from sampling error due to the clustered distribution of these items, and does not necessarily indicate a limited temporal distribution of siltstone/mudstone concretions.

At 45-OK-2A, the relative frequencies of CCS materials display a different pattern. Petrified wood is absent, jasper tends to increase through time, and chalcedony and opal fluctuate but show no definite trend. Quartzite tends to fluctuate randomly, and the samples of basalt and fine-grained basalt from 45-OK-2A are not large enough to allow us to determine trends. Artifacts of obsidian, argillite, granitic materials, and silicized mudstone also occur at 45-OK-2A, but in such small numbers that no distributional patterns can be discerned.

At the level of division shown in Table 3-9, few materials exhibit definite decreases or increases in relative frequency through time. However, when the materials are grouped into more inclusive categories, stronger trends are apparent (Figure 3-3). At both sites, the proportion of CCS materials (jasper, chalcedony, petrified wood, and opal) increase through time, and the proportion of quartzite decreases. Basalt occurs in relatively constant

Table 3-9. Material frequencies by zone, 45-OK-2 and 45-OK-2A.

Material Type		45-OK-2					45-OK-2A				
		Zone				Total	Zone				Total
		1	2	3	4		1	2	3	4	
Jasper	N	8,555	5,871	3,361	1,189	18,976	1,155	488	98	40	1,781
	%	36.8	32.7	34.8	41.4	35.3	71.8	68.2	66.2	67.8	70.3
Chalcedony	N	6,317	3,263	876	309	10,765	285	144	35	10	474
	%	27.2	18.2	9.1	10.7	20.0	17.7	20.1	23.6	16.9	18.7
Petrified Wood	N	247	276	95	23	641	-	-	-	-	-
	%	1.1	1.5	1.0	0.8	1.2					
Opal	N	3,963	4,285	2,197	412	10,857	46	13	1	2	62
	%	17.1	23.9	22.7	14.3	20.2	2.9	1.8	0.7	3.4	2.4
Quartzite	N	3,785	3,862	2,786	693	11,126	116	64	10	5	195
	%	16.3	21.5	28.8	24.1	20.7	7.2	8.9	6.8	8.5	7.7
Fine-Grained Quartzite	N	17	16	7	4	44	-	-	-	-	-
	%	0.1	0.1	0.1	0.1	0.1					
Basalt	N	98	99	112	27	336	1	5	-	2	8
	%	0.4	0.6	1.2	0.9	0.6	0.1	0.7		3.4	0.3
Fine-Grained Basalt	N	73	84	94	193	444	1	-	1	-	2
	%	0.3	0.5	1.0	6.7	0.8	0.1		0.7		0.1
Obsidian	N	48	32	25	5	110	-	1	-	-	1
	%	0.2	0.2	0.3	0.2	0.2		0.1			0.0
Argillite	N	6	2	6	1	15	2	-	-	-	2
	%	0.0	0.0	0.1	0.0	0.0	0.1				0.1
Granitic	N	15	21	13	7	56	2	1	-	-	3
	%	0.1	0.1	0.1	0.2	0.1	0.1	0.1			0.1
Siltstone/ Mudstone	N	1	7	59	3	70	-	-	-	-	-
	%	0.0	0.0	0.6	0.1	0.1					
Steatite	N	22	1	-	-	23	-	-	-	-	-
	%	0.1	0.0			0.0					
Schist	N	3	2	1	-	6	-	-	-	-	-
	%	0.0	0.0	0.0		0.0					
Shale	N	1	1	-	-	2	-	-	-	-	-
	%	0.0	0.0			0.0					
Silicified Mudstone	N	60	95	24	1	180	-	-	2	-	2
	%	0.3	0.5	0.2	0.0	0.3			1.4		0.1
Indeterminate	N	32	9	3	8	52	1	-	1	-	2
	%	0.1	0.1	0.0	0.3	0.1	0.1		0.7		0.1
Total	N	23,243	17,936	9,659	2,875	53,713	1,609	716	148	59	2,532

proportions at 45-OK-2A, and tends to decrease at 45-OK-2. These trends in material frequencies duplicate those observed elsewhere in the Plateau.

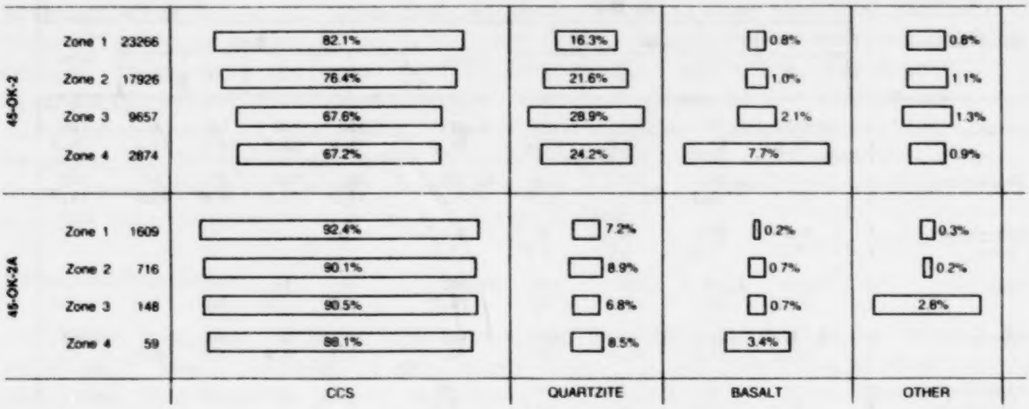

Figure 3-3. Proportions of major material types by zone, 45-OK-2 and 45-OK-2A.

Leonhardy and Rice (1970) note that basalt is the dominant lithic material used in the Cascade and Tucannon phases, with the relative proportion of CCS materials increasing in later phases. Grabert (1968b) has noted the same pattern in the Wells Reservoir, with a steady decrease in the relative proportion of basalt from the Okanogan phase to the Cassimer Bar phase. The increase in frequency of CCS materials in late prehistoric times is accompanied by an increase in the variety of materials. In the Kettle Falls region, imported ignimbrite occurs for the first time in the Shwayip period (A.D. 1400 to historic times) and imported CCS and obsidian are found in greater frequencies than in the preceding period (Chance and Chance 1977:230).

Industry Characteristics

The remarkable consistency of proportions of CCS object types among the zones and sites (Table 3-10) indicates that reduction techniques varied little. Although within each site most categories of object types vary by less than 1% among the zones, there are some trends which might be significant. At 45-OK-2, the relative frequency of conchoidal flakes increases through time and the relative frequency of chunks decreases. This trend does not occur at 45-OK-2A, in fact, the proportion of conchoidal flakes decreases from Zone 4 to Zone 1 and the proportion of chunks generally

Table 3-10. Cryptocrystalline object types by zone, 45-OK-2 and 45-OK-2A.

Object Type		45-OK-2					45-OK-2A				
		Zone				Total	Zone				Total
		1	2	3	4		1	2	3	4	
Conchoidal Flake[1]	N	16,634	11,833	5,652	1,631	35,850	1,262	547	116	48	1,973
	%	87.2	87.1	86.6	84.3	86.9	84.9	84.8	86.6	92.3	85.2
Core	N	2	7	5	3	17	-	-	-	-	-
	%	0.0	0.1	0.1	0.2	0.0					
Linear Flake	N	23	13	6	4	46	2	1	1	-	4
	%	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.7		0.2
Resharpening Flake	N	20	13	2	2	37	-	-	-	-	-
	%	0.1	0.1	0.0	0.1	0.1					
Chunk	N	1,474	1,086	558	177	3,294	151	74	12	2	239
	%	7.7	7.9	8.5	9.2	8.0	10.2	11.5	9.0	3.8	10.3
Projectile Points and Fragments	N	138	95	41	11	285	17	2	1	-	20
	%	0.7	0.7	0.6	0.6	0.7	1.1	0.3	0.7		0.9
Biface	N	189	99	51	26	365	15	3	-	-	18
	%	1.0	0.7	0.8	1.3	0.9	1.0	0.5			0.8
Burin/Spokeshave	N	1	2	-	-	3	1	-	-	-	1
	%	0.0	0.0			0.0	0.1				0.0
Drill	N	4	4	4	-	12	1	-	-	-	1
	%	0.0	0.0	0.1		0.0	0.1				0.0
Graver	N	5	3	3	3	14	2	-	1	-	3
	%	0.0	0.0	0.0	0.2	0.0	0.1		1.9		0.1
Scraper	N	11	11	9	1	32	1	3	1	1	6
	%	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.7	1.9	0.3
Tabular Knife	N	-	1	-	-	1	-	-	-	-	-
	%		0.0			0.0					
Bifacially Retouched Flake	N	101	57	23	9	190	4	-	-	-	4
	%	0.5	0.4	0.4	0.5	0.5	0.3				0.2
Unifacially Retouched Flake	N	110	92	54	20	276	6	2	-	-	8
	%	0.6	0.7	0.8	1.0	0.7	0.4	0.3			0.3
Utilized Flake	N	363	283	117	45	808	24	13	3	-	40
	%	1.9	2.1	1.8	2.3	2.0	1.6	2.0	2.2		1.7
Weathered/ Indeterminate	N	7	6	4	1	18	-	-	-	-	-
	%	0.0	0.0	0.1	0.1	0.0					
Total	N	19,082	13,705	6,529	1,933	41,249	1,486	645	134	51	2,317

[1] Includes 33 flakes < 1/4 in.

increases. However, the sample sizes are so small for Zones 3 and 4 that these are not necessarily valid trends. The other interesting trend is the gradual decrease in unifacially retouched flakes through time at 45-OK-2. The apparently reversed trend at 45-OK-2A cannot be considered significant because of the small sample sizes, nor can the decreasing proportions of scrapers.

Comparison of the zones (Table 3-11) indicates that the proportion of tertiary flakes increased through time, while the proportion of secondary flakes decreased. On the other hand, the proportions of tertiary and secondary chunks fluctuate but form no regular pattern. There is a general tendency for the flakes to become smaller through time, although the Zone 3 flakes are slightly larger on the average than those of Zone 4 (Table 3-12). The small sample sizes at 45-OK-2A prevent any patterns from being recognized.

Table 3-11. Dorsal cortex on Cryptocrystalline flakes and chunks by zone, 45-OK-2 and 45-OK-2A.

Object Type	Dorsal Cortex		45-OK-2					45-OK-2A				
			Zone				Total	Zone				Total
			1	2	3	4		1	2	3	4	
Conchoidal Flakes[1]	None	N	16,853	12,059	5,662	1,642	36,216	1,283	554	118	48	2,003
		%	98.9	98.4	97.7	97.3	98.5	99.1	99.1	100.0	100.0	99.2
	Partial	N	177	182	126	42	527	11	5	-	-	16
		%	1.0	1.5	2.2	2.5	1.4	0.9	0.9			0.8
	Complete	N	5	2	5	-	12	1	-	-	-	1
		%	0.0	0.0	0.1		0.0	0.1				0.0
	Indeterminate/NA	N	12	7	1	3	23	-	-	-	-	-
		%	0.1	0.1	0.0	0.2	0.1					
	Total	N	17,047	12,250	5,794	1,687	36,778	1,295	559	118	48	2,020
Chunks	None	N	1,437	1,067	538	177	3,219	6	3	-	-	9
		%	92.9	92.3	90.0	94.7	92.3	3.9	3.8			3.7
	Partial	N	105	86	59	7	257	6	5	1	-	12
		%	6.8	7.4	9.9	3.7	7.4	3.9	6.4	8.3		4.9
	Indeterminate/NA	N	5	3	1	3	12	142	70	11	2	225
		%	0.3	0.3	0.2	1.6	0.3	92.2	89.7	91.7	100.0	91.5
	Total	N	1,547	1,156	598	187	3,488	154	78	12	2	246

[1] Flakes < 1/4 in. excluded because of non-comparable recording.

Table 3-12. Average measurements of cryptocrystalline flakes[1] by zone, 45-OK-2 and 45-OK-2A.

Measurement		45-OK-2					45-OK-2A				
		Zone				Total	Zone				Total
		1	2	3	4		1	2	3	4	
Length (.1 cm)	$\bar{x}$	10.8	11.0	11.4	11.3	11.0	11.0	11.7	11.0	11.9	11.2
	s.d.	3.4	3.6	3.8	4.1	3.6	3.3	4.2	2.8	8.4	3.6
	N	10,470	7,548	3,621	1,043	22,682	762	358	66	27	1,213
Width (.1 cm)	$\bar{x}$	11.1	12.2	14.3	12.0	12.0	14.3	17.4	20.0		15.2
	s.d.	6.4	7.3	7.7	7.5	7.1	6.5	6.5	–	–	6.5
	N	442	327	163	73	1,005	23	8	1		32
Thickness (mm)	$\bar{x}$	23.9	27.4	33.0	25.0	26.6	35.6	36.4	37.0		35.9
	s.d.	17.4	22.9	25.4	17.7	21.0	19.8	21.8	–	–	19.7
	N	549	426	201	95	1,271	24	9	1		34
Weight (.1 gm)	$\bar{x}$	5.7	7.3	10.3	7.3	7.1	1,18.2	96.0			639.0
	s.d.	11.2	15.1	18.5	11.6	14.0	–	–	–	–	767.9
	N	968	739	322	146	2,175	1	1			2
Total	N	12,429	9,040	4,307	1,357	27,133	810	376	68	27	1,281

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[1] Flakes < 1/4 in. excluded because of noncomparable measurements.

There is no evidence of significant change in the use of obsidian through time (Table 3-13).

Table 3-13. Obsidian object types by zone, 45-OK-2 and 45-OK-2A.

Object Type		45-OK-2					45-OK-2A
		Zone				Total	Zone
		1	2	3	4		2
Conchoidal Flake(s)	N	43	30	24	4	101	-
	%	89.5	93.8	96.0	80.0	91.8	
Chunk(s)	N	3	1	1	-	5	1
	%	6.3	3.1	4.0		4.5	100.0
Projectile Point(s) and Fragment(s)	N	1	-	-	1	2	-
	%	2.1			20.0	1.8	
Utilized Flake(s)	N	1	1	-	-	2	-
	%	2.1	3.1			1.8	
Total	N	48	32	25	5	110	1

The quartzite industry changed little through time at 45-OK-2 (Table 3-14). All of the variations in object type frequencies between zones seem to be random fluctuations, except possibly the decrease in tabular knives. Sample sizes are too small at 45-OK-2A to allow comparison among zones. Table 3-15 compares the average length of quartzite flakes among the zones at 45-OK-2. This length decreases from 25.8 cm in Zone 4 to 16.1 cm in Zone 1.

Sample sizes are too small to allow comparison of fine-grained quartzite object type frequencies among zones (Table 3-16), except in the case of conchoidal flakes, which vary randomly without forming a trend. No pattern is apparent in the variation of average length of fine-grained quartzite among the zones (Table 3-15).

No particular changes in the technological uses of basalt or fine-grained basalt are noted among the zones (Table 3-17 and 3-18). The object types vary considerably, but no significant patterns are discernible. The occurrence of cortex fluctuates randomly as do the measurements.

The most notable difference among the granitic material assemblages is that in Zone 3 and Zone 4 they are dominated by conchoidal flakes, rather than cobble tools (Table 3-19). The sample sizes in these two zones, however, are so small that this is not considered significant.

Other materials show no significant changes (Table 3-20).

Relative Proportions of CCS Materials

The discussion of lithic industries showed that the different CCS materials play a nearly identical technological role in comparison with other materials, yet some differences were noted in the respective reduction products. In this section we examine the changes in proportion of different

Table 3-14. Quartzite object types by zone, 45-OK-2 and 45-OK-2A.

Object Type		45-OK-2					45-OK-2A				
		Zone				Total	Zone				Total
		1	2	3	4		1	2	3	4	
Conchoidal Flake	N	45	41	37	8	131	-	-	-	-	-
	%	1.2	1.1	1.3	1.2	1.2					
Tabular Flake	N	3,350	3,417	2,489	615	9,871	84	49	3	4	140
	%	88.5	88.5	89.3	88.7	88.7	72.4	76.6	30.0	80.0	71.8
Chunk	N	296	268	150	44	758	28	8	31	-	39
	%	7.8	6.9	5.4	6.3	6.8	24.8	12.5	30.07		20.0
Biface	N	-	2	1	-	3	-	-	-	-	-
	%		0.1	0.0		0.0					
Tabular Knife	N	87	123	101	25	336	4	6	32	-	13
	%	2.3	3.2	3.6	3.6	3.0	3.4	9.4	30.0		6.7
Bifacially Retouched Flake	N	-	3	-	-	3	-	-	-	-	-
	%		0.1			0.0					
Unifacially Retouched Flake	N	1	2	-	-	3	-	-	-	-	-
	%	0.0	0.1			0.0					
Utilized Flake	N	-	1	1	-	2	-	-	-	-	-
	%		0.1	0.0		0.0					
Amorphously Flaked Cobble	N	2	-	-	-	2	-	-	-	-	-
	%	0.1				0.0					
Chopper	N	2	-	-	-	2	-	1	1	-	2
	%	0.1				0.0		1.6	10.0		1.0
Hammerstone	N	2	2	3	-	7	-	-	-	1	1
	%	0.1	0.1	0.1		0.1				20.0	0.5
Weathered/ Indeterminate	N	-	1	-	-	1	-	-	-	-	-
	%		0.0			0.0					
Total	N	3,785	3,862	2,786	693	11,126	116	64	10	5	195

Table 3-15. Average length of quartzite and fine-grained quartzite flakes by zone, 45-OK-2.

Material	Statistic	Zone			
		1	2	3	4
Quartzite (.1 cm)	$\bar{x}$	16.1	17.8	20.8	25.8
	s.d.	10.5	12.8	20.3	21.7
	N	43	38	35	6
Fine-Grained Quartzite (.1 cm)	$\bar{x}$	13.0	21.2	26.0	6.0
	s.d.	8.1	20.0		
	N	8	10	1	1

Table 3-16. Fine-grained quartzite object types by zone, 45-OK-2.

Object Type		Zone				Total
		1	2	3	4	
Conchoidal Flake	N	10	11	5	3	29
	%	58.8	68.8	71.4	75.0	65.9
Tabular Flake	N	1	4	1	-	6
	%	5.9	25.0	14.3		13.6
Chunk	N	2	-	-	1	3
	%	11.8			16.7	6.8
Tabular Knife	N	2	-	-	-	2
	%	11.8				4.5
Unifacially Retouched Flake	N	-	1	-	-	1
	%		6.3			2.3
Utilized Flake	N	1	-	-	-	1
	%	5.9				2.3
Chopper	N	1	-	-	-	1
	%	5.9				2.3
Hammerstone	N	-	-	1	-	1
	%			14.3		2.3
Weathered/ Indeterminate	N	-	-	-	1	1
	%				16.7	2.3
Total		17	16	7	6	44

Table 3-17. Basalt object types by zone, 45-OK-2 and 45-OK-2A.

Object Type		45-OK-2					45-OK-2A			
		Zone				Total	Zone			Total
		1	2	3	4		1	2	4	
Concoidal Flake	N	56	65	83	14	218	–	1	2	3
	%	57.1	65.7	74.1	51.9	64.9		20.0	100.0	37.5
Tabular Flake	N	1	–	–	–	1	–	–	–	–
	%	1.0				0.3				
Chunk	N	3	1	1	1	6	–	–	–	–
	%	3.1	1.0	0.9	3.7	1.8				
Projectile Points and Fragments	N	1	2	–	–	4	–	–	–	–
	%	1.0	1.9			1.2				
Biface	N	2	1	2	–	5	–	–	–	–
	%	2.0	1.0	1.8		1.5				
Tabular Knife	N	–	1	–	–	1	–	1	–	1
	%		1.0			0.3		20.0		12.5
Unifacially Retouched Flake	N	1	–	–	–	1	–	–	–	–
	%	1.0				0.3				
Utilized Flake	N	1	–	–	–	1	–	–	–	–
	%	1.0				0.3				
Chopper	N	13	3	5	2	23	–	1	–	1
	%	13.3	3.0	4.5	7.4	6.8		20.0		12.5
Net Weight	N	1	–	–	–	1	–	–	–	–
	%	1.0				0.3				
Anvil	N	3	2	1	1	7	–	–	–	–
	%	3.1	2.0	0.9	3.7	2.1				
Edge-Ground Cobble	N	–	1	–	–	1	–	–	–	–
	%		1.0			0.3				
Hammerstone	N	2	6	6	3	17	–	1	–	1
	%	2.0	6.1	5.4	11.1	5.1		20.0		12.5
Pestle	N	–	–	–	–	–	–	1	–	1
	%							20.0		12.5
Milling Stone	N	4	4	4	1	13	–	–	–	–
	%	4.1	4.0	3.6	3.7	2.7				
Hopper Mortar Base	N	–	1	–	–	1	–	–	–	–
	%		1.0			0.3				
Bead	N	3	10	8	3	24	–	–	–	–
	%	3.1	10.1	7.1	11.1	7.3				
Weathered/ Indeterminate	N	7	2	2	1	12	1	–	–	–
	%	7.1	2.0	1.8	3.7	3.6	100.0			
Total	N	98	99	112	27	336	1	5	2	8

Table 3-18. Fine-grained basalt object types by zone, 45-OK-2 and 45-OK-2A.

Object Type		45-OK-2					45-OK-2A		
		Zone				Total	Zone		Total
		1	2	3	4		1	3	
Conchoidal	N	68	82	89	192	431	1	1	2
	%	93.2	96.7	94.7	99.5	97.1	100.0	100.0	100.0
Chunk	N	2	1	1	-	4	-	-	-
	%	2.7	1.2	1.1		0.9			
Projectile Points and Fragments	N	2	-	4	-	6	-	-	-
	%	2.7		4.3		1.4			
Biface	N	1	-	-	1	2			
	%	1.4			0.5	0.5			
Utilized Flake	N	-	1	-	-	1	-	-	-
	%		1.2			0.2			
Total		73	84	94	193	444	1	1	2

Table 3-19. Object types of granitic materials by zone, 45-OK-2 and 45-OK-2A.

Object Type		45-OK-2					45-OK-2A		
		Zone				Total	Zone		Total
		1	2	3	4		1	2	
Conchoidal Flake	N	4	3	1	6	14	-	1	1
	%	26.7	14.3	7.7	85.7	25.0		50.0	33.3
Chunk	N	-	1	2	-	3	-	-	-
	%		4.8	15.4		5.4			
Tabular Knife	N	3	2	-	-	5	1	-	1
	%	20.0	9.5			8.9	100.0		33.3
Utilized Flakes	N	-	-	1	-	1	-	-	-
	%			7.7		1.8			
Amorphously Flaked Cobble	N	-	1	1	-	2	-	-	-
	%		4.8	7.7		3.6			
Chopper	N	1	2	-	-	3	-	1	1
	%	6.7	9.5			5.4		50.0	33.3
Anvil	N	-	3	-	-	3	-	-	-
	%		14.3			5.4			
Pestle	N	1	1	-	-	2	-	-	-
	%	6.7	4.8			3.6			
Hammerstone	N	2	2	3	1	8	-	-	-
	%	13.3	9.5	23.1	14.3	14.3			
Milling Stone	N	3	2	1		5	-	-	-
	%	20.0	9.5	7.7		8.9			
Hopper Mortar Base	N	-	-	2	-	2	-	-	-
	%			15.4		3.6			
Weathered/ Indeterminate	N	1	4	2	-	7	-	-	-
	%	6.7	19.1	15.4		12.5			
Total	N	15	21	13	7	56	1	2	3

Table 3-20. Object types of other materials by zone, 45-OK-2 and 45-OK-2A.

Material	Object Type		45-OK-2					45-OK-2A		
			Zone				Total	Zone		Total
			1	2	3	4		1	3	
Steatite	Tabular Flake	N %	19 86.4	1 100.0	–	–	20 87.0	–	–	–
	Ground Stone Fragment	N %	1 4.5	–	–	–	1 4.3	–	–	–
	Shaped Ground Stone	N %	2 9.0	–	–	–	2 8.6	–	–	–
	Total	N	22	1	–	–	23	–	–	–
Siltstone/ Mudstone	Indeterminate	N	1	7	59	3	70	–	–	–
Silicized Mudstone	Conchoidal Flake	N %	57 95.0	86 90.5	22 91.7	1 100.0	166 92.2	–	2 100.0	2 100.0
	Chunk	N %	1 1.7	2 2.1	1 4.2	–	4 2.2	–	–	–
	Projectile Point	N %	–	1 1.1	–	–	1 0.6	–	–	–
	Biface	N %	2 3.3	–	1 4.2	–	3 1.7	–	–	–
	Bifacially Retouched Flake	N %	–	1 1.1	–	–	1 0.6	–	–	–
	Unifacially Retouched Flake	N %	–	2 2.1	–	–	2 1.1	–	–	–
	Utilized Flake	N %	–	3 3.2	–	–	3 1.7	–	–	–
	Total	N	60	95	24	1	180	–	2	2
Argillite	Conchoidal Flake	N %	2 33.3	1 50.0	6 100.0	1 100.0	10 66.7	2 100.0	–	2 100.0
	Projectile Point	N %	3 50.0	1 50.0	–	–	4 26.7	–	–	–
	Biface	N %	1 16.7	–	–	–	1 6.7	–	–	–
	Total	N	6	2	6	1	15	2	–	2

Table 3-20. Cont'd.

Material	Object Type		45-OK-2					45-OK-2A		
			Zone				Total	Zone		Total
			1	2	3	4		1	3	
Schist	Tabular Flake	N	2	1	1	–	4	–	–	–
		%	66.7	50.0	100.0		66.7			
	Chunk	N	1	–	–	–	1	–	–	–
		%	33.3				16.7			
	Indeterminate	N	–	1	–	–	1	–	–	–
		%		50.0			16.7			
	Total	N	3	2	1	–	6	–	–	–
Shale	Chunk	N	–	1	–	–	1	–	–	–
		%		100.0			50.0			
	Utilized Flake	N	1	–	–	–	1	–	–	–
		%	100.0				50.0			
	Total	N	1	1	–	–	2	–	–	–
Indeterminate	Conchoidal Flake	N	1	–	–	–	1	–	1	1
		%	3.6				2.1		100.0	50.0
	Tabular Flake	N	2	–	–	–	2	–	–	–
		%	7.1				4.2			
	Chunk	N	2	1	–	1	4	–	–	–
		%	7.1	11.1		12.5	8.3			
	Unifacially Retouched Flake	N	–	–	–	1	1	–	–	–
		%				12.5	2.1			
	Net Weight	N	1	–	–	–	1	–	–	–
		%	3.6				2.1			
	Bead	N	7	5	3	4	19	1	–	1
		%	25.0	55.6	100.0	50.0	39.6	100.0		50.0
	Weathered/ Indeterminate	N	15	3	–	2	20	–	–	–
		%	53.6	33.3		25.0	41.7			
	Total	N	28	9	3	8	48	1	1	2

CCS materials among the zones, and the implications for procurement and preference between these very similar materials. Data from 45-OK-2A is not included because of the small sample sizes.

The frequencies of CCS materials relative only to each other is summarized in Figure 3-4. Jasper is the most abundant material, with opal second in abundance and chalcedony third, except in Zone 1 where chalcedony is more abundant than opal. Petrified wood is relatively rare in all zones. The proportions of jasper and chalcedony are inversely proportional, jasper tending to decrease from Zone 4 to Zone 1, and chalcedony tending to increase. Opal and petrified wood have their greatest relative abundance in Zones 2 and 3.

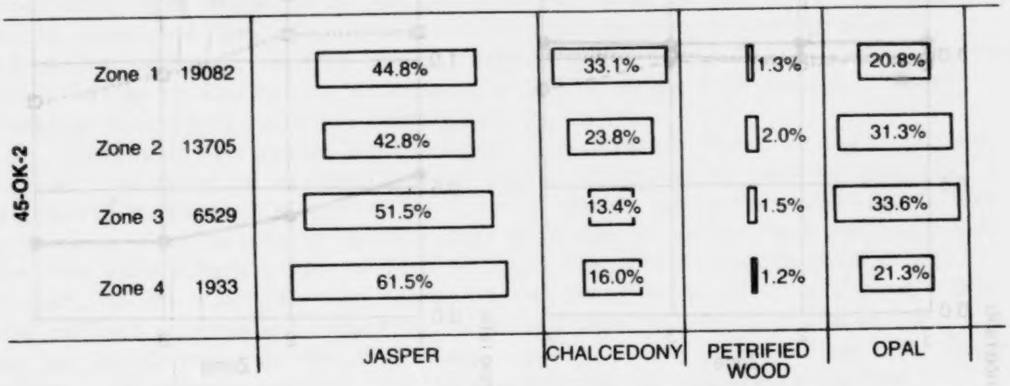


Figure 3-4. Relative proportions of CCS materials by zone, 45-OK-2.

We now examine the contribution of each material type to different object types and the variation of this proportion from zone to zone. To do this we compare the percentage which a given material constitutes of a particular object type, with the percentage the material constitutes of the whole assemblage. If a material is used for a particular object type in a higher proportion than that material occurs in the assemblage as a whole, then the material is preferred for that use, or the techniques used and mechanical properties of the material result in different proportions of products. If we examine this ratio zone by zone, we can note changes in preference. This type of analysis was performed for the four largest object type categories: concholdal flakes, chunks, projectile points, and utilized flakes (Figure 3-5). Petrified wood was included in the percentage calculations, but omitted from the graphs.

In all the zones, concholdal flakes include slightly fewer examples of opal and more of chalcedony than expected on the basis of the occurrence of these material in the assemblage (Figure 3-5a). The proportion of jasper varies but is very close to the amount expected on the basis of its overall proportion (value of 1). However, this category varies much less than the others, which may be partially due to the large sample size for this object type. Opal contributes a disproportionate amount of chunks in all zones, while chalcedony consistently contributes less than expected (Figure 3-5b).

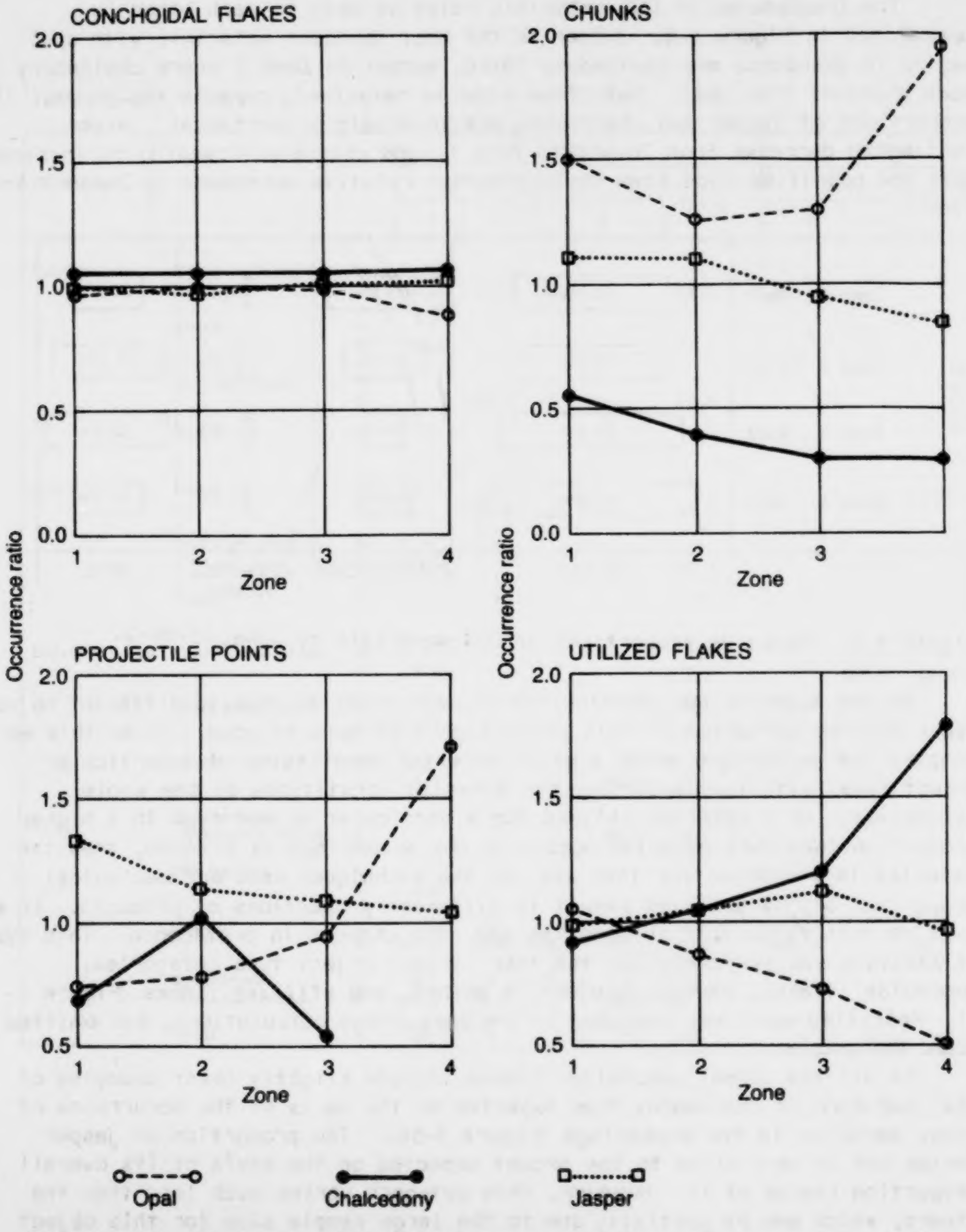


Figure 3-5. Changes in CCS material use, 45-OK-2. The occurence ratio is: % material/object type, divided by % material/assemblage.

Jasper contributes an increasing proportion of chunks through time, although it is always closest to the expected value.

Of the CCS materials, opal clearly is preferred for projectile point manufacture in Zone 4 (Figure 3-5c), but it contributes a smaller and smaller percentage of points in each zone thereafter. Jasper projectile points are slightly more frequent than jasper in general in Zone 4, and jasper contributes increasingly disproportionate numbers of projectile points in the later zones. Chalcedony is not preferred for point manufacture in any of the zones, although in Zone 2 it does occur in amounts proportional to its occurrence in the assemblage. More of the utilized flakes in Zone 4 are chalcedony than expected on the basis of the total percentage of chalcedony, while fewer are opal (Figure 3-5d). The contribution of opal gradually increases, although it does not get higher than 1 until Zone 1. Likewise the contribution of chalcedony decreases, dropping below 1 in Zone 1. Jasper remains relatively constant throughout the zones.

Changes in the use of the different CCS material types through time may reflect the relative availability of usable material, as well as slightly different technological goals. In Zone 4, jasper dominates, and was used to produce a wide variety of tools. Opal also was collected, and was preferred for the manufacture of projectile points. The opal flakes in Zone 4 were longer, on the average, than flakes of any other material in any zone. This may reflect a different reduction technique used to create preforms for projectile points. On the other hand, opal may have been available in larger pieces than other materials, and thus preferred for manufacturing the relatively large projectile points of this zone. The relative brittleness, softness and friability of opal make it less suitable than other cryptocrystalline materials for scraping or cutting tools, but would not constitute as much of a disadvantage for projectile points, particularly for simple lanceolate forms with thick triangular or rhomboidal cross-sections. Chalcedony was even less frequently used, but more unmodified flakes of this material were selected as tools than any other material. Through time, the selection of opal for utilized flakes increased and that of chalcedony decreased, until, by Zone 1, all three materials were used for utilized flakes in roughly the same proportions as they occurred in the assemblage. In Zone 3, opal was no longer preferred for projectile point manufacture, and its use continued to decrease while that of jasper increased.

The overall use of chalcedony increased steadily through time. This may be due to gradual depletion of jasper and opal sources. This explanation is supported by the fact that the average size of jasper and opal flakes decreases through time. Exhaustion of the good jasper and opal sources, and substitution of chalcedony to an increasing extent may account for several trends noted for CCS overall: a decrease in chunk percentage, an increase in flake percentage, an increase in tertiary flake percentage, and a decrease in flake size.

FUNCTIONAL ANALYSIS OF LITHIC ARTIFACTS

Functional information recorded for lithic artifacts includes formal object type, object-specific attributes and wear-specific attributes. Each formal object type is described separately, using two kinds of information recorded in the functional analysis--attributes specific to the object and attributes specific to worn areas on the objects. The wear analysis plays two important roles: it is a functional classification independent of the formal types and provides a means of assessing whether the formal types have functional significance, and it provides information useful in making inferences about object functions. It can also be used directly to compare among zones.

PROJECTILE POINTS

A total of 307 projectile points and projectile point fragments were recorded at 45-OK-2, and 24 at 45-OK-2A (Table 3-21). Projectile points are thin, bilaterally symmetrical shaped objects with points and some provision for hafting. Because of their very regular shapes, it is possible to identify many bifacially worked fragments as pieces of projectile points. Although these fragments may not be amenable to stylistic analysis, they are important to the functional analysis. All of the 45-OK-2A points are made of CCS, as are most points (94.5 percent) at 45-OK-2. Others are made of basalt, fine-grained basalt, obsidian, silicized mudstone, and argillite (the latter two are listed as **Other** in Table 3-21). All of the points are shaped by manufacture into regular forms. A small number of those at 45-OK-2 (4.9 percent) also exhibit wear. The stylistic characteristics of these shaped tools, as well as illustrations of the projectile points, are presented in the stylistic analysis.

The small number of worn areas on projectile points (Table 3-21) suggests that they may have been used for other purposes in addition to their function as the points of projectiles. The relative proportions of kinds of wear and locations of wear are unlike those of any of the other types (Table 3-22 and Figure 3-6). The cases are distributed more evenly among more categories, and no single category is dominant. This is a good indication that the wear types are the result of relatively random incidental uses, rather than wear specific to projectile points as a functional category.

BIFACES

All objects whose shape was completely altered by bifacial flaking, but which could not be assigned to a specific tool category, were typed as bifaces. Most are fragments of bifaces, tips, midsections, and bases. These include fragments of complete tools such as projectile points and drills, and fragments created by breakage during manufacture. Although most of the bifaces and fragments fall within the range of size and shape of projectile points, there are a few distinctive forms, including blunt tips and a few larger, massive bifaces. The biface collections total 384 at 45-OK-2 and 20

Table 3-21. Object characteristics of flake tools by formal type, 45-OK-2 and 45-OK-2A.

Site	Dimension	Attribute		Projectile Point	Biface	Burin	Drill	Graver	Scraper	Spokeshave	Tabular Knife	Bifacially Retouched Flake	Unifacially Retouched Flake	Utilized Only Flake
45-OK-2	Material	CCS	N	290	370	5	12	14	32	-	1	193	276	813
			%	94.5	96.4	100.0	100.0	100.0	100.0		0.3	98.0	96.8	98.5
		Quartzite	N	-	3	-	-	-	-	-	337	3	3	2
			%		0.8						97.4	1.5	1.1	0.2
		Fine-Grained Quartzite	N	-	-	-	-	-	-	-	2	-	1	1
			%								0.6		0.4	0.1
		Basalt	N	4	5	-	-	-	-	-	1	-	1	1
			%	1.3	1.3						0.3		0.4	0.1
		Fine-Grained Basalt	N	6	2	-	-	-	-	-	-	-	-	1
			%	2.0	0.5									0.1
		Obsidian	N	2	-	-	-	-	-	-	-	-	1	2
			%	0.7									0.4	0.2
		Other	N	5	4	-	-	-	-	-	-	1	3	4
			%	1.6	1.0							0.5	1.1	0.5
	Utilization/ Manufacture	Wear Only	N	-	-	3	5	1	-	-	2	-	-	818
			%			60.0	41.7	7.1			0.6			99.2
		Manufacture Only	N	292	341	-	2	1	-	-	31	138	81	-
			%	95.1	88.8		16.7	7.1			9.0	70.1	28.4	
		Wear and Manufacture	N	15	43	1	5	12	32	-	313	59	204	7
			%	4.9	11.2	20.0	41.7	85.7	100.0		90.5	29.9	71.6	0.8
		None	N	-	-	1	-	-	-	-	-	-	-	-
			%			20.0								
	Total N			307	384	5	12	14	32	-	346	197	285	825
45-OK-2A	Material	CCS	N	24	20	-	1	3	6	1	-	5	8	44
			%	100.0	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0
		Quartzite	N	-	-	-	-	-	-	-	13	-	-	-
			%								81.2			
		Basalt	N	-	-	-	-	-	-	-	1	-	-	-
			%								6.2			
		Granitic	N	-	-	-	-	-	-	-	2	-	-	-
			%								12.5			
	Utilization/ Manufacture	Wear Only	N	-	-	-	-	-	-	-	1	-	-	44
			%								6.2			100.0
		Manufacture Only	N	24	20	-	-	-	2	-	1	4	5	-
			%	100.0	100.0				33.3		6.2	80.0	62.5	
		Wear and Manufacture	N	-	-	-	1	3	4	1	14	1	3	-
			%				100.0	100.0	66.7	100.0	87.5	20.0	37.5	
	Total N			24	20	-	1	3	6	1	16	5	8	44

Table 3-21. Cont'd.

Site	Wear Dimension	Attribute		Projectile Point	Biface	Burin	Drill	Graver	Scraper	Tabular Knife	Bifacially Retouched Flake	Unifacially Retouched Flake	Utilized Only Flake
45-OK-2 cont'd.	Edge Angle (degrees)	0-30 (1)	N	5	5	-	-	4	3	44	14	47	509
			%	26.3	8.2			16.0	4.4	10.7	16.5	12.8	46.1
		31-60 (2)	N	14	35	5	10	16	37	305	49	244	496
			%	73.7	51.4	83.3	66.7	64.0	54.4	73.8	57.6	66.7	45.0
		>60 (3)	N	-	21	1	4	5	28	64	22	75	98
			%		34.4	16.7	26.7	20.0	41.2	15.5	25.9	20.5	8.9
		Indeterminate (5)	N	-	-	-	1	-	-	-	-	-	-
			%			6.7							
	Total N			19	61	6	15	25	68	413	85	366	1,103
45-OK-2A	Kind of Wear	Smoothing (2)	N	-	-	-	-	-	-	17	-	-	1
			%							100.0			1.6
		Feather Chipping (5)	N	-	-	-	-	5	-	-	1	1	48
			%					100.0			100.0	16.7	78.7
		Hinge Chipping (10)	N	-	-	-	1	-	11	-	-	5	12
			%				100.0		100.0			83.3	19.7
	Location of Wear	Edge Only (1)	N	-	-	-	-	-	-	17	-	-	1
			%							100.0			1.6
		Unifacial Edge (2)	N	-	-	-	-	4	11	-	1	6	50
			%					80.0	100.0		100.0	100.0	82.0
		Bifacial Edge (3)	N	-	-	-	-	-	-	-	-	-	10
			%									-	16.4
		Point and two Edges (7)	N	-	-	-	1	1	-	-	-	-	-
			%				100.0	20.0					
	Edge Angle (degrees)	0-30 (1)	N	-	-	-	-	2	-	3	-	-	31
			%					40.0		17.6			50.8
		31-60 (2)	N	-	-	-	1	2	6	11	-	4	26
			%				100.0	40.0	54.5	64.7		66.7	42.6
		>60 (3)	N	-	-	-	-	1	5	3	1	2	4
			%					20.0	45.5	17.6	100.0	33.3	6.6
	Total N			-	-	-	1	5	11	17	1	6	61

Table 3-22. Characteristics of worn areas on flake tools by formal type, 45-OK-2 and 45-OK-2A.

Site	Wear Dimension	Attribute		Projectile Point	Biface	Burin	Drill	Graver	Scraper	Tabular Knife	Bifacially Retouched Flake	Unifacially Retouched Flake	Utilized Only Flake
45-OK-2	Kind of Wear	Abrasion/ Grinding (1)	N	-	-	-	-	1	5	1	-	3	-
			%					4.0	7.4	0.2		0.8	
		Smoothing (2)	N	4	2	-	-	-	4	411	2	2	1
			%	21.1	3.3				5.9	99.5	2.4	0.5	0.1
		Crushing/ Packing (3)	N	-	-	1	-	-	-	1	-	-	-
			%			16.7				0.2			
		Feather Chipping (5)	N	4	30	4	4	12	14	-	44	161	890
			%	21.1	49.2	66.7	26.7	48.0	20.6		51.8	44.0	82.7
		Feather Chipping with Smoothing (7)	N	1	3	-	1	1	-	-	3	16	15
			%	5.3	4.9		6.7	4.0			3.5	4.4	1.4
		Hinge Chipping (10)	N	9	20	1	10	10	37	-	34	160	192
			%	47.4	32.8	16.7	66.7	40.0	54.4		4.0	43.7	17.4
		Hinge Chipping with Smoothing (12)	N	1	6	-	-	1	8	-	2	24	4
			%	5.3	9.8			4.0	11.8		2.4	6.6	0.4
		Hinge Chipping with Crushing (13)	N	-	-	-	-	-	-	-	-	-	1
			%										0.1
	Location of Wear	Edge Only (1)	N	-	-	-	-	-	1	411	-	1	2
			%						1.5	99.5		0.3	0.2
		Unifacial Edge (2)	N	9	40	3	5	11	65	2	65	332	1,010
			%	47.4	65.6	50.0	33.3	44.0	95.6	0.5	76.5	90.7	91.6
		Bifacial Edge (3)	N	1	15	1	-	2	2	-	18	32	87
			%	5.3	24.6	16.7		8.0	2.9		21.2	8.7	7.9
		Point Only (4)	N	6	3	2	-	-	-	-	-	-	-
			%	31.6	4.9	33.3							
		Point and Unifacial Edge (5)	N	-	1	-	-	-	-	-	-	-	1
			%		1.6								0.1
		Point and Two Edges (7)	N	3	2	-	10	12	-	-	2	1	3
			%	15.8	3.3		66.7	48.0			2.4	0.3	0.3

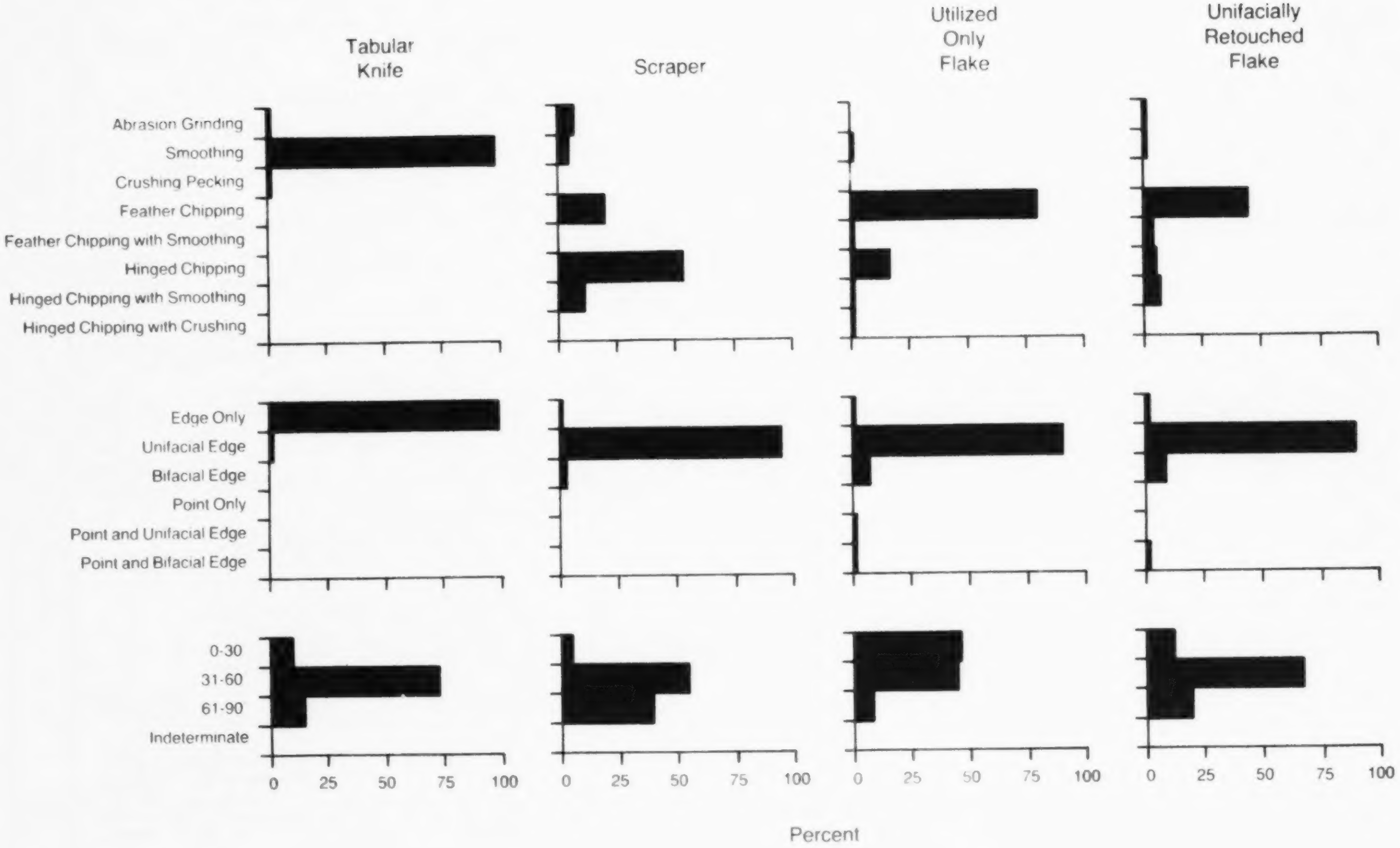


Figure 3-6. Frequency of worn areas on flake tools by formal type, 45-OK-2.

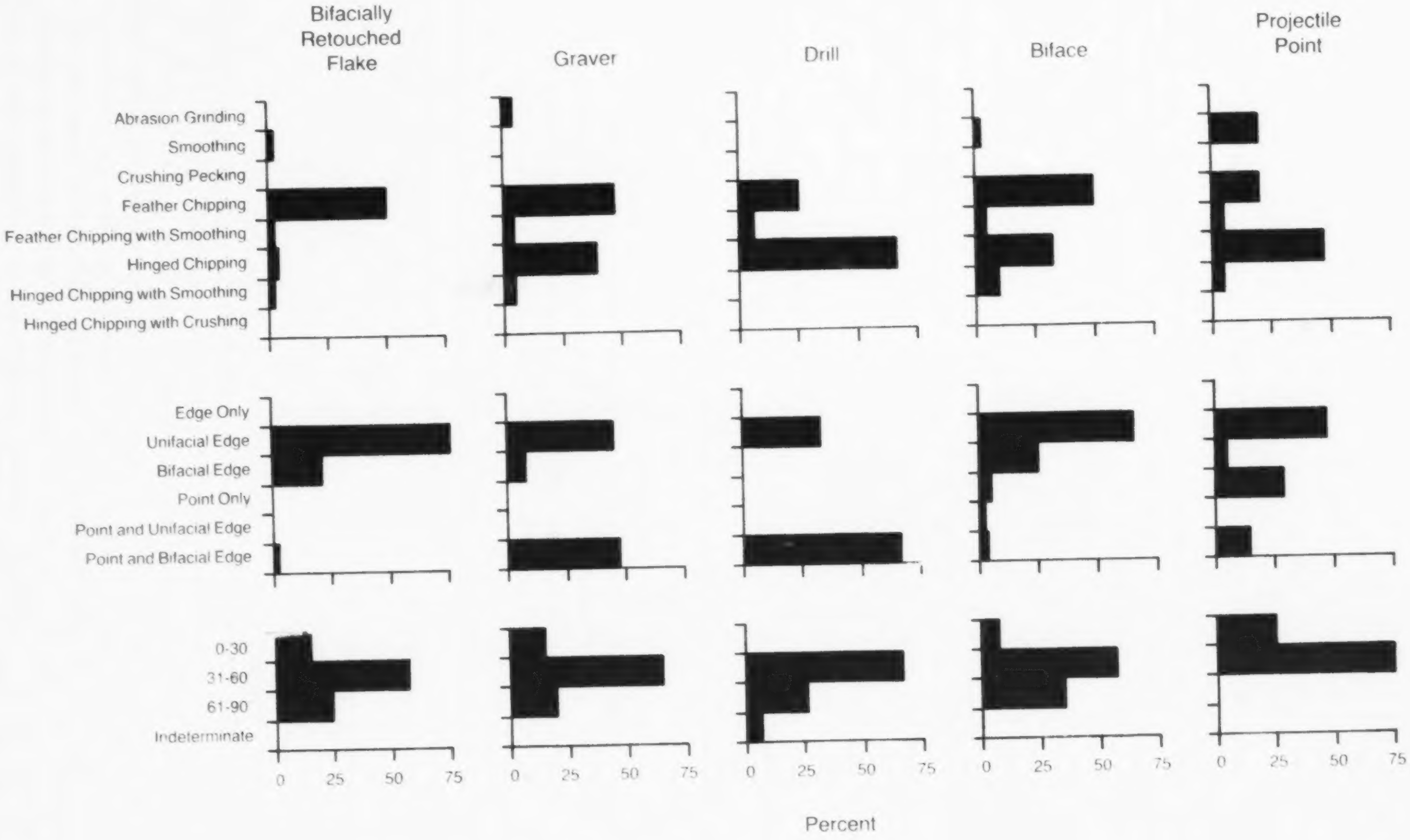


Figure 3-6, cont'd.

at 45-OK-2A (Table 3-21). All of those at 45-OK-2A and the majority, 96.4 percent, at 45-OK-2 are made of CCS. Other materials represented at 45-OK-2 include quartzite, basalt, fine-grained basalt, silicized mudstone and argillite (the latter two are listed as **Other** in Table 3-21). None of the 45-OK-2A bifaces show any wear, while 11.2 percent of those at 45-OK-2 do.

The worn areas on bifaces most closely resemble those found on gravers (Table 3-22 and Figure 3-6). However, a distinctive pattern of locations differentiates the biface wear from the other formal types. Although wear on unifacial edges is dominant, bifacial wear is more commmon than in any other category, approached only by the bifacially retouched flakes. Further, bifaces have the only significant amounts of wear on a point only and on a point and unifacial edge. The worn bifaces are also characterized by the greatest numbers of moderate and high edge angles of any category save scrapers. These characteristics of the worn areas on bifaces are surprising. Of the formal types, only the wear on bifaces is consistent with the sort of wear we would expect on a knife, which indeed bifaces are often thought to be. This wear, however, does not occur with any great frequency: only 11.2 percent of the bifaces are worn. Perhaps, as with the projectile points, the diversity of the wear indicates incidental use.

BURINS AND BURIN SPALLS

Burins are small chisel-like implements derived from flakes, blades, or other objects by removing edges parallel to the long axes of the parent objects. Generally, the burin spall is triangular in cross section; its removal leaves a right angle edge. Used for incising, this sharp corner often shows wear but rarely retouch. A burin spall from a biface edge has two planes retaining surface flake scars and a single smooth plane resulting from detachment. Wear was required on at least one end of the spall for classification as a burin. Burin spalls were combined here with burins because although they may not be retouched, the fracture is the deliberate consequence of manufacturing. Three burins and two burin spalls were recorded at 45-OK-2 and none at 45-OK-2A (Table 3-21). The wear on burins (not shown in Figure 3-6) is very similar to that on gravers and drills (Table 3-22). An example is illustrated in Plate 3-1; a.

DRILLS

The drill category comprises objects with a bifacially flaked projecting pointed shaft. The remainder of the flake may be bifacially or unifacially modified or unmodified. The entire assemblage of drills—12 at 45-OK-2 and one from 45-OK-2A—is made of CCS (Table 3-21). Examples are illustrated in Plate 3-1; b-o. The unshaped drills exhibit rotational wear on fortuitous three-sided breaks which are negligibly retouched. Three of these appear to be on cores, and two are on flakes. The shaped drills have several forms, including pentagonal and teardrop shapes. Several are shaped at the proximal end to allow hafting. One drill is a biface fragment, broken to form a point and utilized as a drill with little reworking.

Wear on drills is located exclusively on points and adjacent edges or on unifacial edges, very similar to the location of wear on gravers (Table 3-22 and Figure 3-6). Drills differ from gravers in having a greater frequency of hinged chipping relative to feathered chipping, and a greater number of high edge angles. This confirms that drills were used differently from gravers even though both are pointed tools. Several factors suggest that gravers were used on softer materials than drills: the occurrence of abrasion/grinding, more smoothing in association with chipping, and the greater degree of feathered chipping relative to hinged chipping. The high edge angle of the drill may be a consequence of the very thick cross section their points must have in order to hold up against hard stock.

GRAVERS

Gravers are defined as flakes with a unifacially modified projecting tip. Unifacial flaking creates a shaft and point which is domed in cross section, that is flat on one side and steeply convex on the other. The amount of modification of the remainder of the object is variable, as is the size and length of the point. The 17 gravers--14 from 45-OK-2 and three from 45-OK-2A--are all manufactured from CCS material (Table 3-21). Two are small flakes with small projections worked by unifacial retouch. Three are flakes that have projections which appear to be fortuitous and exhibit negligible retouch. The remaining gravers are long linear flakes which have been unifacially retouched to form blunt points. They are worked primarily along the point and a short distance from the point; the proximal ends show only minor retouch. Examples are illustrated in Plate 3-2;a-q.

Surprisingly, the types of wear on gravers are nearly the same as those on bifaces (Table 3-22 and Figure 3-6). However, the location of wear is quite different: almost 50 percent of the graver wear occurs on a point and two edges; this location occurs infrequently on the bifaces. In fact, the location of wear on gravers is very similar to that on drills, which have wear exclusively on points and adjacent edges or on unifacial edges. The gravers have more feathered chipping relative to hinged chipping than do drills, and a fewer number of high edge angles. These differences confirm that they were used in different ways even though both are pointed tools. Several factors suggest that gravers were used on softer materials than drills: the occurrence of abrasion/grinding, more smoothing in association with chipping, and the greater degree of feathered chipping relative to hinged chipping. The slightly higher proportions of wear on unifacial and bifacial edges in comparison to points and edges may indicate that the gravers were more often used at an oblique angle than the drills.

SCRAPERS

Scrapers were defined as flakes with steep, unifacial retouch forming a convex edge, and sufficient modification to alter the shape of the original flake. Only complete, shaped objects were included. Scraper fragments were assigned to the unifacially retouched flake category. A total of 32 scrapers

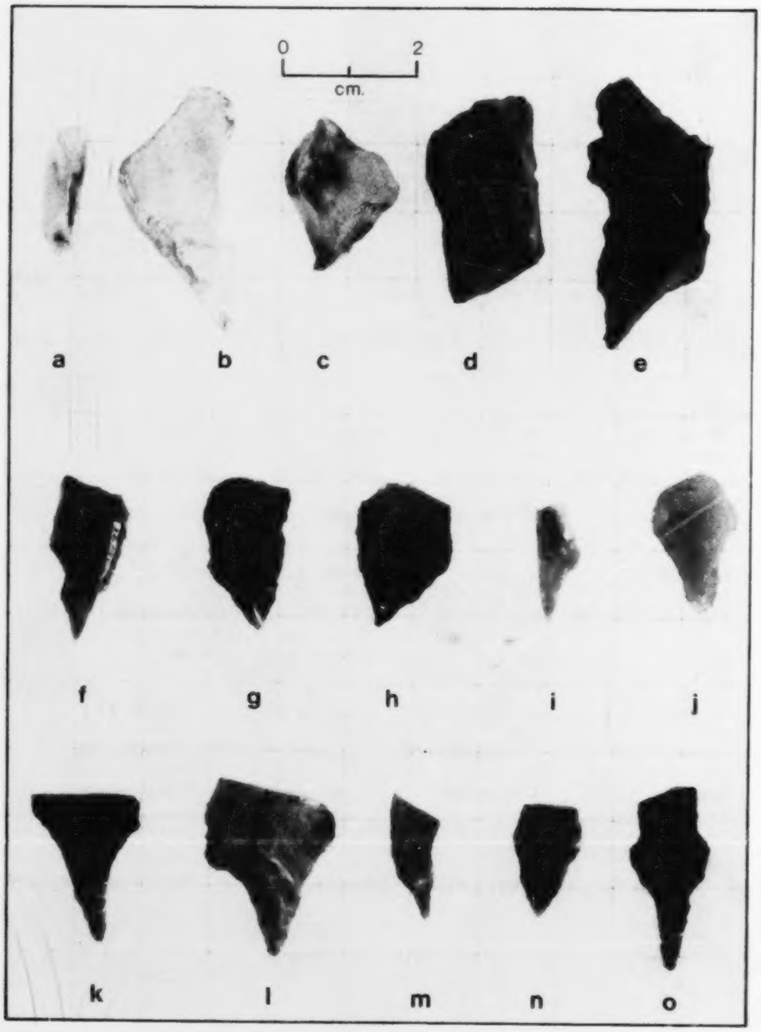
KEY
Site Number:
Master Number:
Tool Type:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.	e.
45-OK-2	45-OK-2	45-OK-2	45-OK-2	45-OK-2
2552	2349	3084	2974	1271
Burin	Drill	Drill	Drill	Drill
43S376W/40	46S376W/60	36S374W/10	20S351W/40	49S390W/80
2	3	1	2	3
Jasper	Opal	Chalcedony	Opal	Jasper

f.	g.	h.	i.	j.
45-OK-2	45-OK-2	45-OK-2	45-OK-2	45-OK-2
3024	2038	2570	2292	68
Drill	Drill	Drill	Drill	Drill
22S362W/50	27S366W/40	29S359W/60	31S369W/60	35S380W/60
2	3	1	1	2
Opal	Chalcedony	Chalcedony	Chalcedony	Chalcedony

k.	l.	m.	n.	o.
45-OK-2	45-OK-2A	45-OK-2A	45-OK-2	45-OK-2A
1350	934	13	192	18
Drill	Drill	Drill	Drill	Drill
51S389W/30	48S393W/80	7N133E/50B	48N28E/40	19N6E/110B
1	3	2	1	3
Jasper	Opal	Jasper	Jasper	Jasper

Plate 3-1. Illustrations of burins and drills, 45-OK-2 and 45-OK-2A.


0
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cm.
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c
d
e
f
g
h
i
j
k
l
m
n
o

KEY

Site Number:
Master Number:
Provenience/Level:
Zone:
Material:

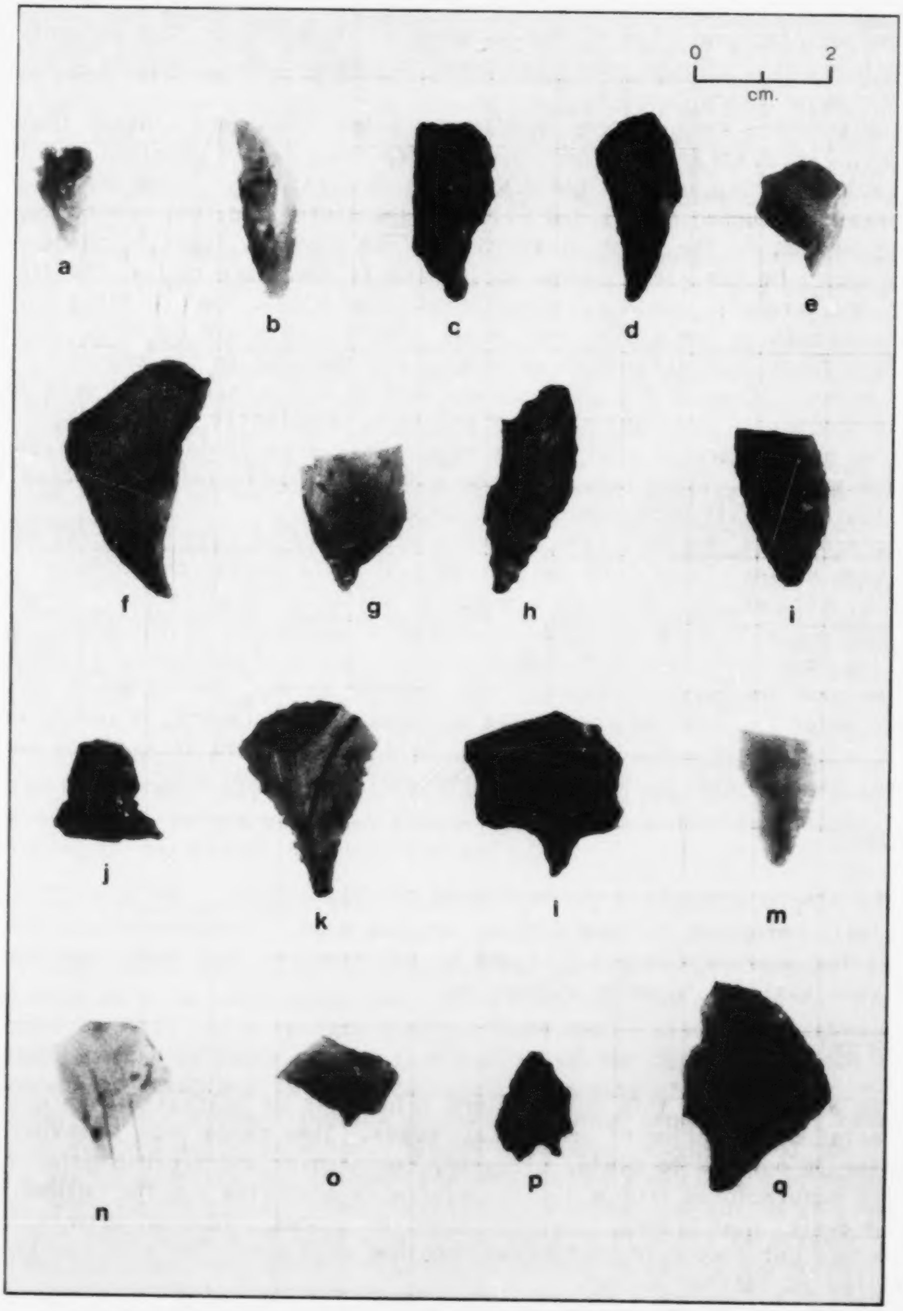
a.	b.	c.	d.	e.
45-OK-2	45-OK-2	45-OK-2	45-OK-2	45-OK-2
1182	3081	379	1289	1413
13S349W/50	37S373W/70	35S385W/90	49S389W/90/18	46S386W/30
3	2	2	4	1
Chalecedony	Chalcedony	Jasper	Jasper	Chalcedony

f.	g.	h.	i.
45-OK-2	45-OK-2	45-OK-2	45-OK-2
2981	94	1493	2118
21S351W/120/F20	34S382W/40	46S391W/10	28S370W/30
4	2	1	1
Jasper	Chalcedony	Jasper	Jasper

j.	k.	l.	m.
45-OK-2	45-OK-2	45-OK-2	45-OK-2
844	2745	176	251
84S544W/140/F888	15S358W/30	38S385W/60	23S400W/30
4	2	3	1
Jasper	Opal	Jasper	Jasper

n.	o.	p.	q.
45-OK-2A	45-OK-2	45-OK-2A	45-OK-2A
85	543	117	184
35N14E/30/F12	55S445W/0/F600	35N29E/10/F17	48N92E/150
2	1	1	4
Opal	Chalcedony	Jasper	Chalcedony

Plate 3-2. Illustrations of gravers, 45-OK-2 and 45-OK-2A.


0
2
cm.
a
b
c
d
e
f
g
h
i
j
k
i
m
n
o
p
q

were collected at 45-OK-2 and 6 at 45-OK-2A, all made of CCS material (Table 3-21). All of the examples from 45-OK-2, and most from 45-OK-2A, exhibit both wear and manufacture. Two of the scrapers at 45-OK-2A, or 33.3 percent, have manufacture only, with no wear; the other two have both. Examples are illustrated in Plate 3-3;a-r.

The scrapers vary greatly in size and shape. Most are classic thumbnail scrapers, with a steep front end, and sloping towards the proximal end in side view, while flaring towards the distal end in plan view. These are invariably unifacially retouched across the wide, convex distal end, and are retouched to varying degrees on the other sides to form the regular, tapering shape. Wear always occurs on the wide, convex end, which is therefore called the distal end; a few scrapers, however, are worn on other sides. Some of these have rounded corners on the distal end, while others have acute corners. Whether this is a functional difference or simply a difference in the amount of wear is not known. Three of the scrapers are worked unifacially all around to form a round shape with a slight notch at one side, apparently for hafting. These appear to be worn around most of the edge. This assemblage also includes a few side scrapers --long narrow flakes with steep unifacially retouched edges. These flakes exhibit both concave and convex edges.

Scrapers are characterized by the predominance of both unifacial wear and steep edge angles (Table 3-22 and Figure 3-6). The latter characteristic is shared by bifaces, but the predominance of unifacial wear is not. Scrapers also contrast with bifaces in having a greater abundance of abrasion, smoothing, and smoothing with chipping wear, and a predominance of hinged chipping over feathered chipping. Like tabular knives, the scrapers were used on soft material, causing them to be polished. The scrapers, however, were used at a different angle: the edge was held obliquely to the surface being scraped, as indicated by the almost invariably unifacial wear.

SPOKESHAVE

The single spokeshave is from 45-OK-2A (Table 3-21). It is a CCS flake unifacially retouched to form a steep concave edge. Spokeshaves also occur on some of the gravers (Plate 3-2; l and p, for example), but these combination tools were assigned to other categories.

TABULAR KNIVES

The artifacts in this category are thin slabs of quartzite with unifacial or bifacial modification of some or all edges. They range from somewhat irregular in outline to ovate, circular, rectangular and subtriangular forms. They are manufactured from a locally available quartzite (in the Columbia River gravels) that breaks into thin lamellar pieces. Tabular objects lacking manufacture but displaying extensive smoothed edge attrition also may be classified as tabular knives.

The tabular knives are one of the most common tool types at both 45-OK-2 and 45-OK-2A (Table 3-21). They are also one of the most uniform tool types in terms of size, three-dimensional shape, material, and wear. The great majority of these (97.4 percent at 45-OK-2 and 81.2 percent at 45-OK-2A) are quartzite, but there also are examples formed of CCS, fine-grained quartzite, basalt, and granitic material. A few exhibit wear and no manufacture. These flakes were detached from the cobble with such regular shapes that they required no further shaping. The majority, however, have been bifacially flaked on one or more edges. They have regular, rectangular to ovoid shapes. Only a few examples (9.0 percent at 45-OK-2 and 6.2 percent at 45-OK-2A) do not exhibit wear in addition to the manufacture. Examples are illustrated in Plate 3-4;a-l.

The predominance of smoothing wear and the confinement of that wear to the edge only make tabular knives distinctive (Table 3-22 and Figure 3-6). The smoothing indicates that these tools were used to work soft materials; the circumscribed area of smoothing suggests that they were held perpendicular to the material. The orientation of wear (not shown in Table 3-22) could be determined in only 25 cases; in one case the wear had a diffuse orientation, but in the other 24 wear was oriented perpendicular to the long axis of the edge. The perpendicular wear indicates that the tool was moved along the material in a direction perpendicular, rather than parallel, to the long axis of the worn edge. Like scrapers, the tabular knives were used on soft material, causing them to be polished. The scrapers, however, were used at a different angle: the edge was held obliquely to the surface being scraped, as indicated by the almost invariably unifacial wear. However, the lack of chipping wear on tabular knives cannot be considered a significant contrast with scrapers. Because chipping wear on tabular knives could not easily be distinguished from flaking due to manufacture, by convention all flaking was attributed to manufacture and only smoothing, crushing or abrasion were called wear. The difficulty in distinguishing manufacture and wear flaking on tabular knives may result from a real difference in how they were used in comparison with scrapers, or may simply reflect the weaker conchoidal fracturing of quartzite in comparison with CCS.

BIFACIALLY RETOUCHED FLAKES

Flakes which were bifacially retouched, but not totally shaped, were classified as bifacially retouched flakes. Most of the objects in this category are CCS, but a few are quartzite and one is silicized mudstone (listed as other in Table 3-21). Examination of the objects assigned to this category at 45-OK-2 and 45-OK-2A reveals a diversity of object characteristics. Members include flakes which have been partially retouched to form an edge appropriate for a specific purpose, fragments of tools broken during use or maintenance, fragments broken during manufacture of formed items, and bipolar cores. Flakes exhibiting manufacture but no wear are more prevalent than those with both wear and manufacture, so it is assumed that most are manufacturing debris. However, this may be partly due to the conservative criteria used for identifying wear on a manufactured edge.

This category does not correspond to the common notion of a tool type. Because broken objects, unfinished objects, and worn tools have been combined, the functional significance of the category is questionable. The one

KEY
Site Number:
Master Number:
Provenience/Level:
Zone:
Material:

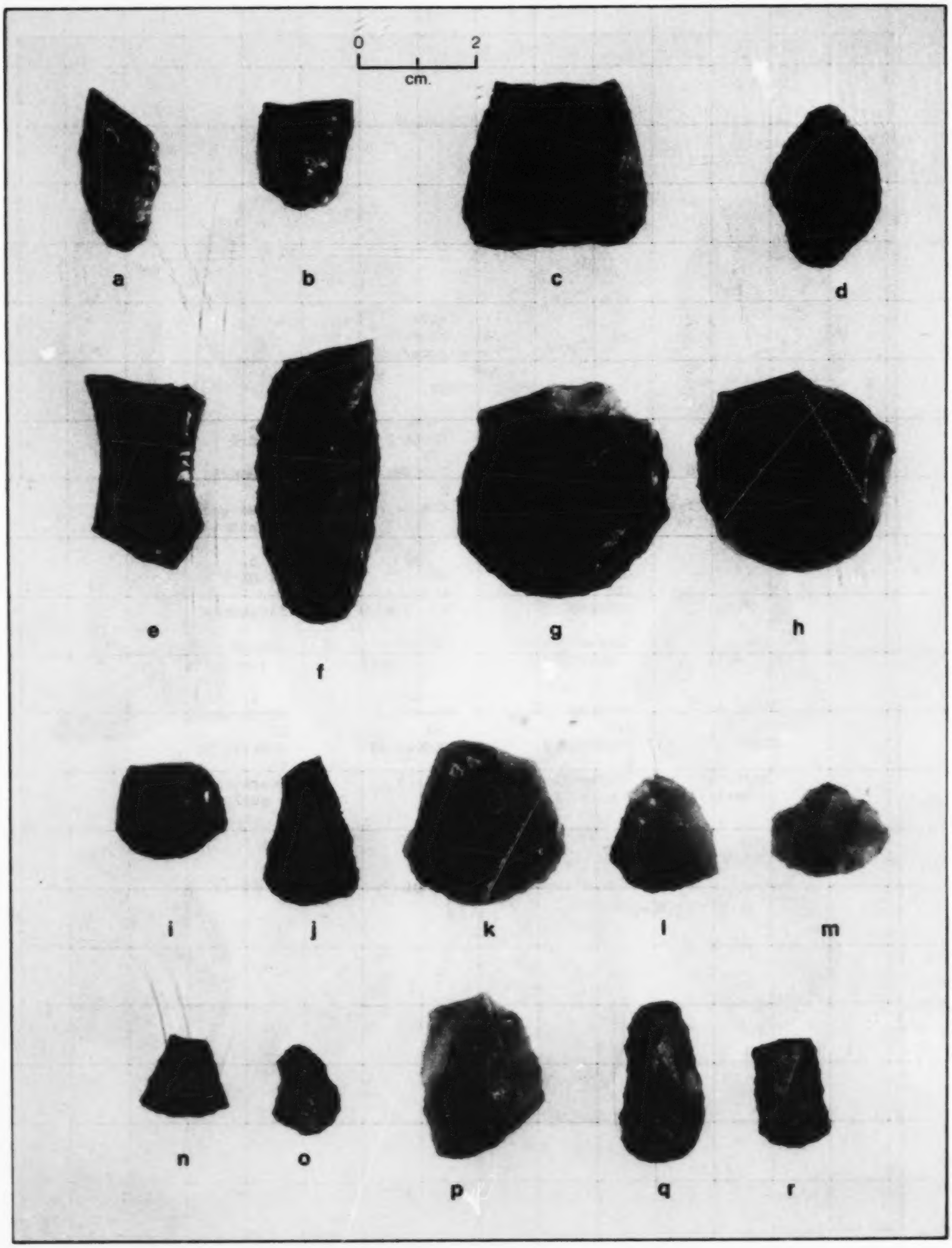
a.	b.	c.	d.
45-OK-2A	45-OK-2A	45-OK-2	45-OK-2
206	188	4	1676
48N89E/110	45N92E/F11/100	32S385W/20	45S384W/70
4	2	1	2
Jasper	Jasper	Petrified Wood	Jasper

e.	f.	g.	h.
45-OK-2	45-OK-2	45-OK-2	45-OK-2
3105	2155	2554	1686
39S372W/30	40S381W/30	29S360W/10	42S388W/30
1	1	1	1
Petrified Wood	Jasper	Chalcedony	Chalcedony

i.	j.	k.	l.	m.
45-OK-2	45-OK-2	45-OK-2	45-OK-2	45-OK-2
649	1967	2548	21	281
52S442W/50	27S368W/40	43S/377W/50	33S385W/40	23S385W/10
2	3	3	1	1
Petrified Wood	Jasper	Jasper	Jasper	Jasper

n.	o.	p.	q.	r.
45-OK-2	45-OK-2	45-OK-2	45-OK-2	45-OK-2
828	97	3028	643	1987
83S549W/80	34S382W/70	22S362W/110	51S445W/40/600	42S384W/50/F110
3	2	3	1	2
Jasper	Opal	Jasper	Jasper	Opal

Plate 3-3. Illustrations of scrapers, 45-OK-2 and 45-OK-2A.


0
2
cm.
a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r

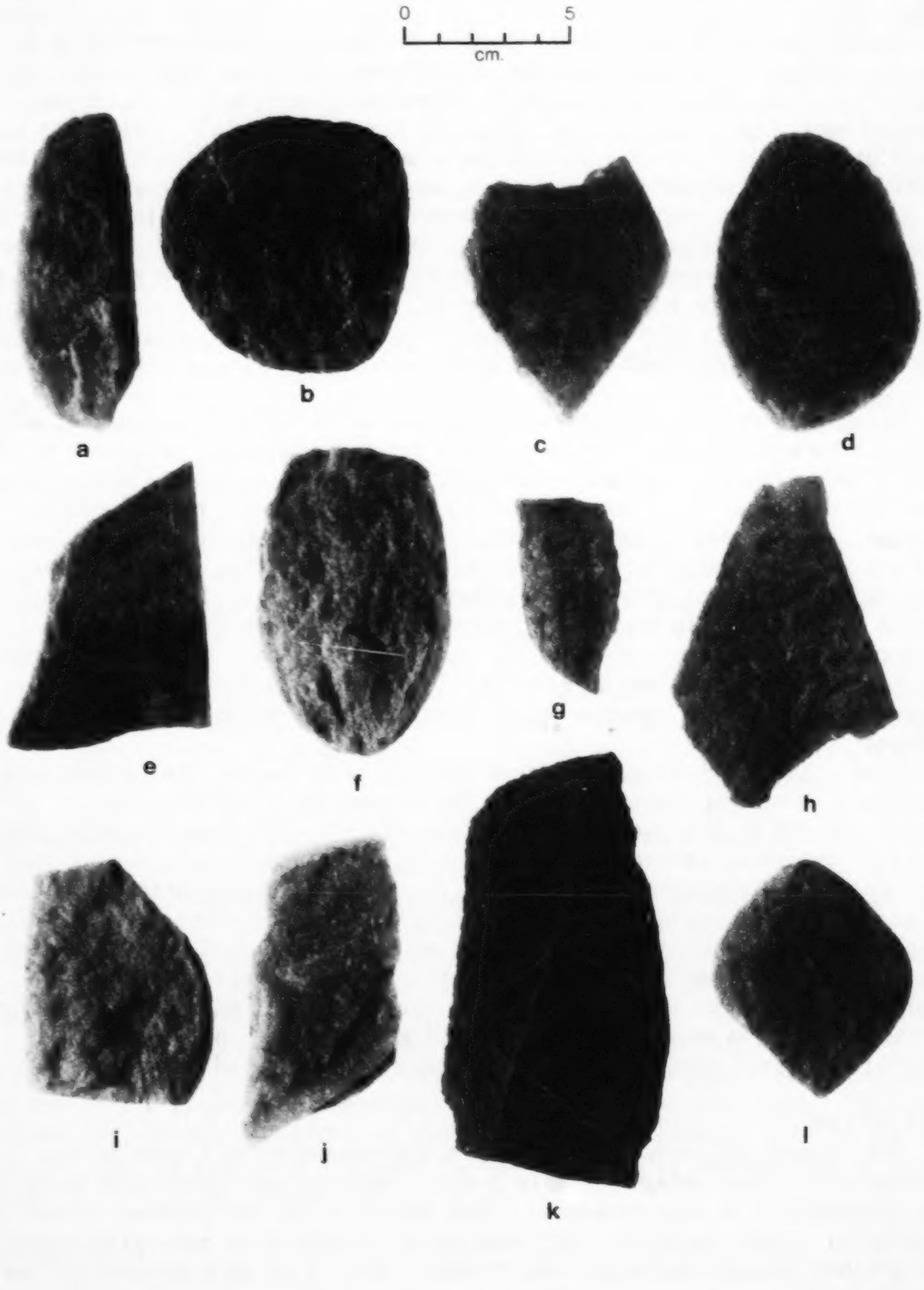
KEY
Site Number:
Master Number:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.
45-OK-2	45-OK-2	45-OK-2	45-OK-2
477	571	776	175
54S443W/70	55S450W/10/F600	79S548W/40	38S385W/50
3	1	2	2
Coarse-grained quartzite	Jasper	Coarse-grained quartzite	Coarse-grained quartzite

e.	f.	g.	h.
45-OK-2	45-OK-2	45-OK-2	45-OK-2
216	196	41	527
47S401W/60	38S386W/40	34S381W/30	51S448W/30
3	2	1	1
Coarse-grained quartzite	Coarse-grained quartzite	Coarse-grained quartzite	Coarse-grained quartzite

i.	j.	k.	l.
45-OK-2	45-OK-2	45-OK-2A	45-OK-2A
655	215	154	67
53S442W/50	47S401W/60	40N84E/40	32N113E/20
2	3	2	1
Coarse-grained quartzite	Coarse-grained quartzite	Basalt	Coarse-grained quartzite

Plate 3-4. Illustrations of tabular knives, 45-OK-2 and 45-OK-2A.


0
5
cm.
a
b
c
d
e
f
g
h
i
j
k
l

functional trait which the members have in common is that they are flakes in which extra energy has been invested to achieve a particular shape or edge angle.

Bifacially retouched flakes resemble unifacially retouched flakes and utilized flakes in the predominance of feathered chipping (Table 3-22) and Figure 3-6). However, the bifacially retouched flakes have a higher degree of bifacial wear. Like unifacially retouched flakes, bifacially retouched flakes have higher proportions of moderate and steep edge angles than the utilized flakes. It would appear that the edges were retouched specifically to alter the edge angle. No specific function should be assigned to this category as a whole: when the dimensions are looked at in combination, a very diverse set of wear types is exhibited. It should also be noted that some of the "wear" may be residual attrition from manufacture.

UNIFACIALLY RETOUCHED FLAKES

This category includes flakes which are unifacially retouched but not totally altered in shape. Flakes of many types of material have been altered in this way. The dominant material is CCS; the other materials are comparatively rare: together, quartzite, fine-grained quartzite, basalt, obsidian, and "other" at 45-OK-2 total less than 3.4 percent of the assemblage (Table 3-21). In comparison with the bifacially retouched flakes, a smaller percentage of this category are manufacturing debris. Most of the examples at 45-OK-2 exhibit wear in addition to manufacture. The manufactured only flakes are actually more common at 45-OK-2A, but given the small sample size, the picture from 45-OK-2 is more reliable. This indicates that unifacial retouching usually was undertaken to alter an edge for use rather than to make a shaped tool.

Like bifacially retouched flakes and utilized flakes, the unifacially retouched flakes are characterized by the predominance of feathered chipping (Table 3-22 and Figure 3-6). The unifacially retouched flakes have a greater amount of abrasion, smoothing, and smoothing associated with chipping than the other two. This suggests that unifacially retouched flakes often were used in the same manner as scrapers. Like bifacially retouched flakes, unifacially retouched flakes have higher proportions of moderate and steep edge angles than the utilized flakes. It would appear that edges were retouched specifically to alter the edge angle. No specific function should be assigned to these categories as a whole: when the dimensions are looked at in combination, these categories exhibit a great diversity of wear types.

UTILIZED FLAKES

The largest single category of worn and manufactured flakes is the utilized only flake category (Table 3-21). Two utilized cores from 45-OK-2 also are counted in this category. This category has the greatest diversity of material types, including CCS, quartzite, fine-grained quartzite, basalt, fine-grained basalt, obsidian, and "other." CCS, with 98.9 percent of the total, is the dominant material, however. By definition, these flakes exhibit wear and no manufacture.

The utilized flakes resemble the bifacially retouched flakes, and unifacially retouched flakes in the predominance of feathered chipping (Table 3-22 and Figure 3-6). However, utilized flakes have a greater amount of hinged chipping than the other two categories, as well as a higher frequency of low edge angles. No specific function can be assigned to this category as a whole: when the dimensions are intersected there are many types of wear. However, it is important to note that the utilized flakes are used for tasks requiring low edge angles, which the shaped tools cannot perform.

AMORPHOUSLY FLAKED COBBLES

Four cobbles at 45-OK-2 are classified as amorphously flaked cobbles (Table 3-23). They exhibit random flaking which does not form an edge, and none are worn. The two granite and two quartzite cobbles do not appear to have been used as tools in the functional sense. They may be cobbles that were partially worked and then abandoned before they were finished, or they may be cores. They would not, however, have met the definition of core used in the analysis.

CHOPPERS

Choppers are one of the most common cobble tools at each site, second only to hammerstones in frequency at 45-OK-2 (Table 3-23). Examples of choppers are illustrated in Plate 3-5;a-g. Basalt was used most frequently, followed by quartzite, with a few examples of granitic material and fine-grained quartzite. The choppers tend to be spalls or tabular flat cobbles with at least one bifacially flaked edge. Several of these are flaked on more than one side or around the entire periphery. A few are made from rounded river cobbles. One large quartzite cobble merits closer scrutiny--it has several flake scars off one edge, the largest being 3.2 cm wide and 4.9 cm long. They are all concentrated on one side, and the edge is very steep, approximately 90 degrees--indeed, the edge resembles a core platform more than a chopper. It may well be a core, in fact.

A few of the choppers are flaked but not worn, while the majority (80.6 percent at 45-OK-2 and 100.0 percent at 45-OK-2A) are both worn and manufactured (Table 3-23). Crushing wear predominates (Table 3-24); this occurs on an edge and extends onto both adjacent surfaces. However, two choppers exhibit hinged chipping with smoothing and one exhibits smoothing wear. Neither smoothing or hinged chipping with smoothing occur on any other cobble tool type. Wear located only on an edge, or unifacially on an edge occurs in low proportions on choppers and on no other tool type. The wear is convex, or, rarely, straight in shape, and the edge angles usually are steep. The one case of wear on a terminal surface is actually hammerstone wear occurring on a combination tool.

HAMMERSTONES

Hammerstones are the most common cobble tool type (Table 3-23) and the

KEY
Master Number:
Provenience/Level:
Zone:
Material:

a.
1624
18S369W/60
2
Basalt

b.
860
85S544W/150/F73
4
Coarse-grained quartzite

c.
576
55S449W/20/F600
1
Basalt

d.
1230
48S390W/60
3
Basalt

e.
1969
27S368W/40
3
Coarse-grained quartzite

f.
183
38S384W/70
3
Coarse-grained basalt

g.
809
82S549W/110
4
Basalt

Plate 3-5. Illustrations of choppers, 45-OK-2.

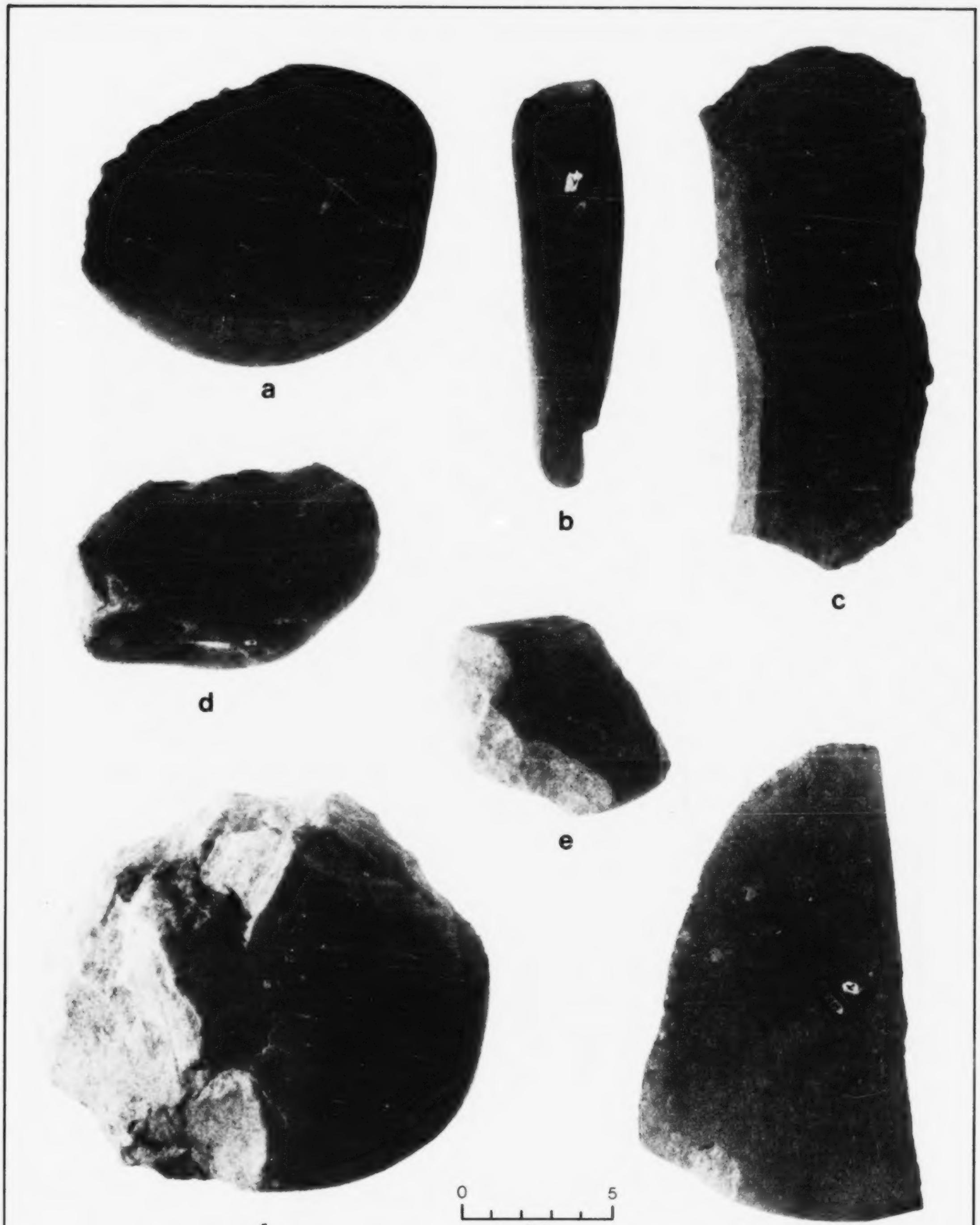

a
b
c
d
e
f
0
5
cm.
g

Table 3-23. Object characteristics of cobble tools by formal type, 45-OK-2 and 45-OK-2A.

			45-OK-2									45-OK-2A		
Dimension	Attributes		Amorphously Flaked Cobble	Chopper	Edge-Ground Cobble	Hammerstone	Resharpening Flake	Net Weight	Anvil	Hopper Mortar Base	Milling Stone	Chopper	Hammerstone	Pestle
Material	Quartzite	N	2	8	-	7	-	-	-	-	-	2	1	-
		%	50.0	22.2		21.2						50.0	50.0	
	Fine-Grained Quartzite	N	-	1	-	1	-	-	-	-	-	-	-	-
		%		2.8		3.0								
	Basalt	N	-	24	1	17	-	1	7	-	9	1	1	1
		%		66.7	100.0	51.5		50.0	70.0		64.3	25.0	50.0	100.0
	Granitic	N	2	3	-	8	2	-	3	2	5	1	-	-
		%	50.0	8.3		24.2	100.0		30.0	100.0	35.7	25.0		
	Indeterminate	N	-	-	-	-	-	1	-	-	-	-	-	-
		%						50.0						
Utilization/ Manufacture	Wear Only	N	-	-	-	26	-	-	-	1	7	-	2	-
		%				78.8				50.0	50.0		100.0	
	Manufacture Only	N	4	7	-	-	1	1	10	-	3	-	-	-
		%	100.0	18.4			50.0	50.0	100.0		21.4			
	Wear and Manufacture	N		29	1	5	1	-	-	-	2	4	-	1
		%		80.6	100.0	15.2	50.0				14.3	100.0		100.0
	Modification Indeterminate	N	-	-	-	2	-	1	-	1	2	-	-	-
		%				6.1		50.0		50.0	14.3			
Type of Manufacture	None	N	-	-	-	26	1	-	10	1	7	-	2	-
		%				78.8	50.0		100.0	50.0	50.0		100.0	
	Chipping	N	4	36	1	5	1	1	-	-	5	4	-	-
		%	100.0	100.0	100.0	15.2	50.0	50.0			35.7	100.0		
	Grinding/ Packing	N	-	-	-	-	-	-	-	-	-	-	-	1
		%												100.0
	Indeterminate	N	-	-	-	2	-	1	-	1	2	-	-	-
		%				6.1		50.0		50.0	14.3			
Total N			4	36	1	33	2	2	10	2	14	4	2	1

Table 3-24. Characteristics of worn areas on cobble tools by formal type, 45-OK-2 and 45-OK-2A.

Dimension	Wear Attributes		45-OK-2							45-OK-2A		
			Chopper	Edge-Ground Cobble	Hammerstone	Pestle	Anvil	Hopper Mortar Base	Milling Stone	Chopper	Hammerstone	Pestle
Kind of Wear	Abrasion/ Grinding (1)	N	-	1	-	-	-	-	1	-	-	-
		%		33.3					10.0			
	Smoothing (2)	N	-	-	-	-	-	-	-	1	-	-
		%								12.5		
	Crushing/ Pecking (3)	N	33	2	48	2	12	1	9	6	7	2
		%	97.1	66.7	100.0	100.0	100.0	100.0	90.0	75.0	100.0	100.0
	Hinged Chipping with Smoothing (12)	N	1	-	-	-	-	-	-	1	-	-
		%	2.9							12.5		
Location of Wear	Edge Only (1)	N	-	-	-	-	-	-	-	4	-	-
		%								50.0		
	Unifacial Edge (2)	N	-	-	-	-	-	-	-	1	-	-
		%								12.5		
	Bifacial Edge (3)	N	33	3	3	-	-	-	-	3	-	-
		%	97.1	100.0	6.3					37.5		
	Surface	N	-	-	2	-	11	1	8	-	-	-
		%			4.2		91.7	100.0	80.0			
	Terminal Surface (8)	N	1	-	43	2	1	-	2	-	7	2
		%	2.9		89.6	100.0	8.3		20.0		100.0	100.0
Shape of Worn Area	Convex (2+7)	N	28	3	45	2	11	-	3	8	7	-
		%	85.3	100.0	93.8	100.0	91.7		30.0	100.0	100.0	
	Concave (3+8)	N	-	-	1	-	-	1	1	-	-	-
		%			2.1			100.0	10.0			
	Straight or Flat (4)	N	5	-	2	-	1	-	5	-	-	2
		%	14.7		4.2		8.3		50.0			100.0
	Irregular (9)	N	-	-	-	-	-	-	1	-	-	-
		%							10.0			
Edge Angle (degrees)	31-60 (2)	N	8	-	2	-	-	-	-	1		
		%	23.5		4.2					12.5		
	>60 (3)	N	25	3	1	-	-	-	-	7	-	-
		%	73.5	100.0	2.1					87.5		
	Surface (4)	N	1	-	45	2	12	1	10	-	7	2
		%	2.9		93.8	100.0	100.0	100.0	100.0		100.0	100.0
	Total N		34	3	48	2	12	1	10	8	7	2

individual artifacts are quite diverse in general shape and in the wear exhibited. These are illustrated in Plate 3-6;a-e and Plate 3-7;a. They are rounded to subangular cobbles and spalls of various substances--basalt, granitic material, quartzite, and fine-grained quartzite. Crushing wear usually occurs on terminal surfaces, but also appears on bifacial edges and surfaces (Table 3-24). The worn areas may be convex, concave, or flat; their edge angles are either moderate or steep. Crushing on the edges of hammerstones is long and linear, and may represent a different use than wear on the terminal surfaces, which is diffuse and localized. Crushing also occurs on edges on hammerstones, but these are more acute, flaked edges.

A few of these cobbles are combination tools. One has the bifacially flaked edge associated with choppers, but is also extensively battered on the opposite end. Two cobbles exhibit irregular pitting on surfaces but also have battered edges or corners. These combination tools account for the two incidences of wear on surfaces noted in Table 3-24. Two artifacts in this category are long, thin cobbles (one is illustrated in Plate 3-7;a). They both are flared at a flat end, with pecking wear and a few random associated flakes going up the edges. These resemble pestles in their wear characteristics more than they do hammerstones, but were excluded from the pestle category because they are irregular in shape or incomplete.

PESTLES

The definition of pestle calls for complete objects with regular shapes. There are three such artifacts (Table 3-23), two from 45-OK-2 and one from 45-OK-2A (Plate 3-7;b-d). Each is a long cylindrical cobble, tapering from the distal to the proximal end. The shapes of two have been modified by pecking; the other is natural. Their distal ends are wide and flat. The distal ends of the unshaped pestle and one of the pecked ones have crushing wear and a few random flakes extending up the shaft. The wear on the pestles resembles that on hammerstones (Table 3-24). The 45-OK-2 examples have crushing wear on a convex terminal surface, which is the same as the dominant wear on hammerstones. The 45-OK-2A example differs in having two flat worn areas. Thus, although wear type does not distinguish hammerstones from pestles, the shape of the object and the location of the wear are distinctive.

EDGE-GROUND COBBLES

Only one edge-ground cobble was found, from 45-OK-2 (Table 3-23). It is a spall of basalt with abraded facets on one edge. Two flaked edges exhibit bifacial crushing wear on a steep, convex edge--the same as the dominant wear type on the choppers. Indeed, but for its abraded facet, the artifact resembles a spall chopper.

NETSINKERS

Two artifacts from 45-OK-2 are classified as net weights (Table 3-23). One is a flat, oval cobble of basalt, with a single flake taken off one side. The flake scar is not crushed or smoothed. The other is a rounded cobble of an indeterminate igneous material (Figure 3-6;f). It has one battered notch and possibly abraded facets on the same edge. Pecking occurs on one end. The pecking and abrasion were not recorded as wear--the analysts could not be certain they were not the result of manufacture. Although there is no distinctive net weight technology in this reservoir, surface finds of net weights have been made at 45-OK-340 (Lawr Salo, personal communication) and in survey and testing (Leeds et al. 1981). Grabert also reports laterally notched, unshaped net sinkers from 45-DO-61 (Grabert 1968:28) and 45-OK-52 (Grabert 1968:63) in the adjoining Wells Reservoir.

ANVILS

Anvils were defined in this analysis as large flat cobbles with crushing wear on a convex surface. The 10 such artifacts from 45-OK-2 are flat basalt and granitic cobbles (Table 3-23) with diffuse crushing wear on a convex surface (Table 3-24). They have not been modified by manufacture.

MILLINGSTONES

Millingstones were defined in this analysis as large flat cobbles with crushing wear on a flat surface. The millingstones from 45-OK-2 are generally flat basalt and granite cobbles (Table 3-23) with diffuse crushing wear located centrally on a flat or indeterminate shaped surface (Table 3-24). Some have been modified by chipping around the edges. Two are modified but it is not clear whether the modification is wear or manufacture.

HOPPER MORTAR BASES

Hopper mortar bases were defined in this analysis as large flat cobbles with crushing wear on a concave surface. The two hopper mortar bases from 45-OK-2 are both granitic cobbles (Table 3-23) with concave areas on the surfaces. One of these exhibits diffuse crushing wear (Table 3-24) in its concavity and has not been modified by manufacture. We have placed the other cobble in this class because of its shape alone: it is unworn and its manufacture indeterminate (Table 3-23).

INDETERMINATE

The indeterminate category contains miscellaneous items, both flakes and cobbles, which have been artificially modified but fit into none of the above categories, such as beads, the steatite pendant and other decorated objects. A number of pieces of CCS which are flaked, but on which it was not possible to distinguish wear and manufacture are assigned to this category. Two shaped cobbles deserve further description, as they may be a specific tool type. One

KEY
Site Number:
Master Number:
Tool Type:
Provenience/Level:
Bone:
Material:

a.
45-OK-2A
15
Hammerstone
7N/33E/90B
Testing
Basalt

b.
45-OK-2
2606
Hammerstone
30S359W/90/F200
2
Basalt

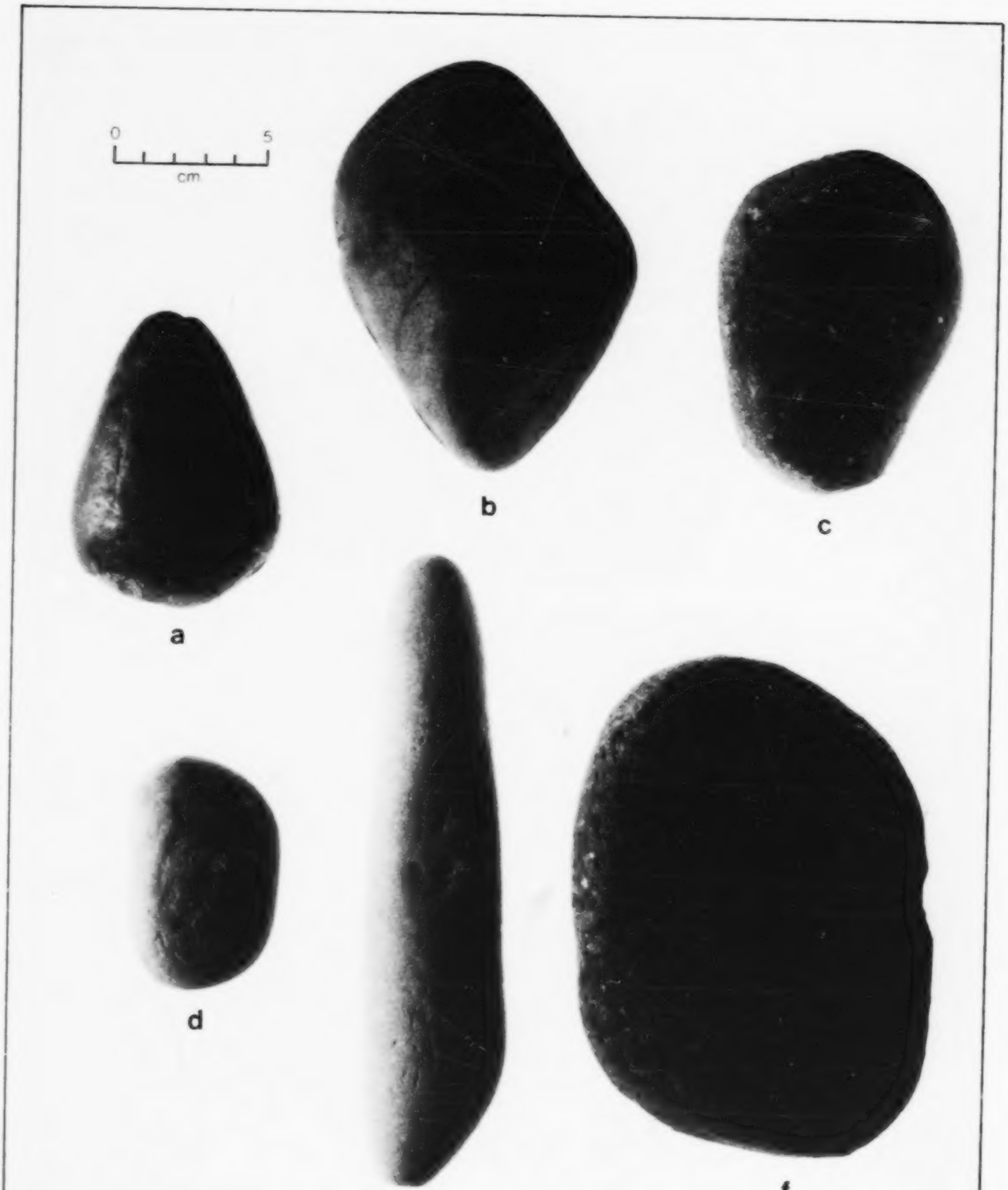
c.
45-OK-2
1673
Hammerstone
45S385W/70
2
Porous microdiorite

d.
45-OK-2
320
Hammerstone
34S385W/90
2
Coarse-grained quartzite

e.
45-OK-2
2354
Hammerstone
47S376W/70
3
Basalt

f.
45-OK-2
1678
Netsinker
42S389W/20/F126
1
Indeterminate

Plate 3-6. Illustrations of hammerstones and netsinker, 45-OK-2 and 45-OK-2A.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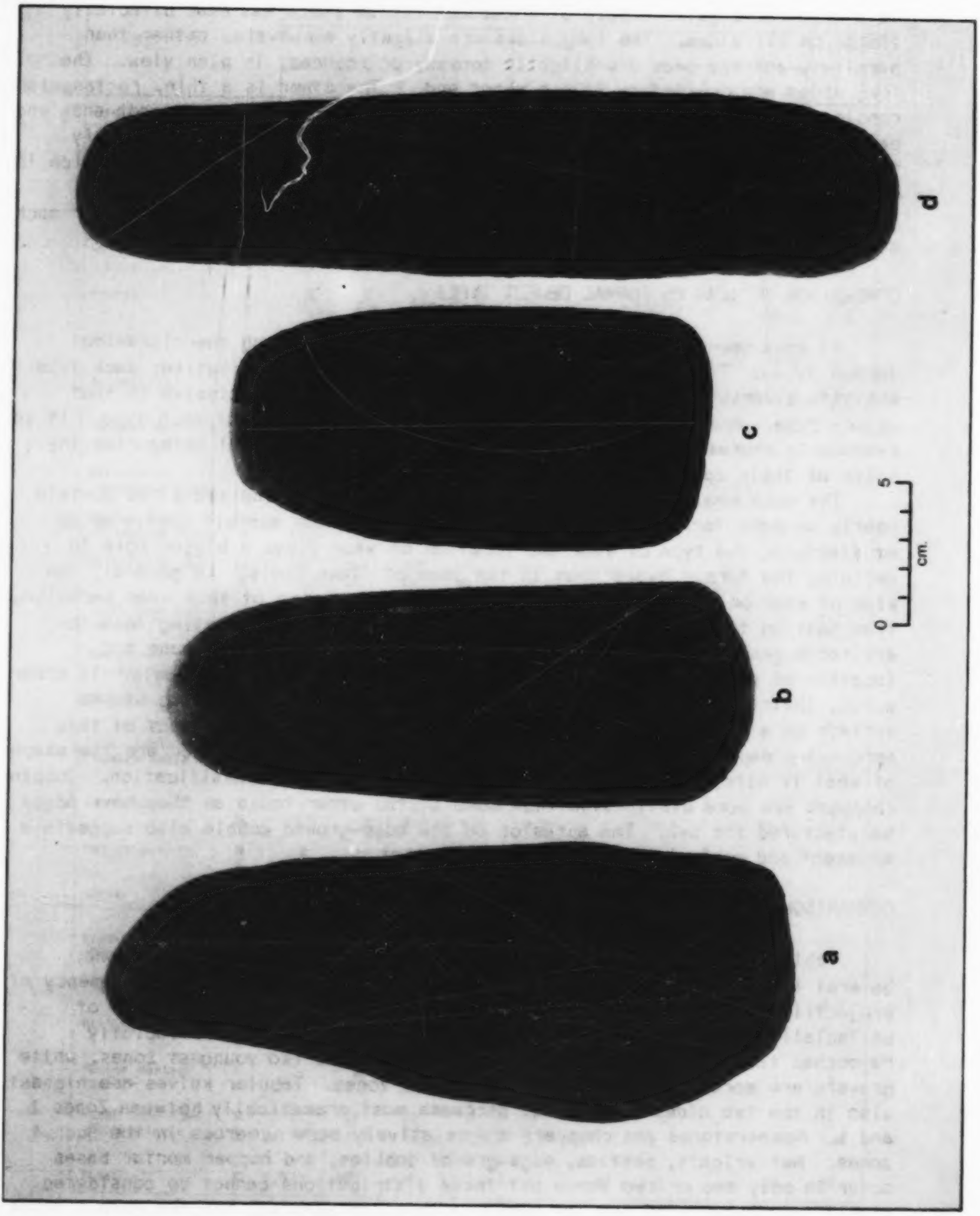
f

KEY	a.	b.	c.	d.
Site Number:	45-OK-2	45-OK-2	45-OK-2A	45-OK-2
Master Number:	1590	67	172	2329
Provenience/Level:	45S389W/80/F104/B88	35S380W/60	43N53E/60	31S367W/50
Zone:	3	2	2	1
Material:	Basalt	Granite	Basalt	Granite

Plate 3-7. Illustrations of pestles, 45-OK-2 and 45-OK-2A.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cm.

is a thin rectangular cobble of micaceous schist which has been bifacially flaked on all sides. The long sides are slightly excurvate, rather than parallel, and the ends are slightly convex, or rounded, in plan view. The long sides are crushed as is one short end. The other is a thin, rectangular cobble of lamellar crystalline rock that is bifacially flaked at both ends and partially unifacially flaked on the sides. The long sides taper slightly towards one end, and the short ends are convex in plan view. One long side is crushed and the ends also appear to be crushed. These objects may have functioned as chisels, although the edges seem overly blunt and steep for such a function.

COMPARISON OF WEAR ON FORMAL OBJECT TYPES

We have seen that the attributes of wear differ among the flake tool formal types. The distinctions are quantitative, not qualitative: each type exhibits diverse wear, few or none of which are classes exclusive to that object type. However some distinctive pattern was noted for each type. It is reasonable therefore to use these formal types as functional categories in spite of their considerable internal variability.

The much smaller assemblages of cobble tools from the two sites contain nearly as many formal object types. As most of these exhibit little or no manufacture, the type of wear and location of wear plays a bigger role in defining the formal types than in the case of flake tools. In general, the kind of wear on cobble tools is less variable, in terms of this wear paradigm, than that on flake tools. Crushing wear predominates, indicating that the artifacts generally were used for percussive tasks. Overall shape and location of wear constitute the major differences between the tools. In other words, their actual use may have been much the same: the striking of the surface of a hard, massive object. The purpose and ultimate effect of this percussion depends more on the weight and shape of the percussor and the shape of what it hits, factors not directly addressed by the classification. Cobble choppers are more distinctive than some of the other tools as they have edges manufactured for use. The abrasion on the edge-ground cobble also suggests a movement and contact other than simple impact.

COMPARISON AMONG ZONES

Table 3-25 summarizes the formal object types at each site by zone. Several interesting trends are apparent at 45-OK-2. The relative frequency of projectile points increases steadily from Zone 4 to Zone 1 while that of unifacially retouched flakes decreases. Utilized flakes and bifacially retouched flakes occur in higher percentages in the two youngest zones, while gravers are more frequent in the two oldest zones. Tabular knives are highest also in the two oldest zones, but decrease most dramatically between Zones 2 and 1. Hammerstones and choppers are relatively more numerous in the Hudnut zones. Net weights, pestles, edge-ground cobbles, and hopper mortar bases occur in only one or two zones but these distributions cannot be considered significant because of the low sample sizes. In general, the two Hudnut zones

Table 3-25. Frequency of formal types by zone, 45-OK-2 and 45-OK-2A.

Object Type		45-OK-2					45-OK-2A				
		Zone				Total	Zone				Total
		1	2	3	4		1	2	3	4	
Projectile Point	N %	145 13.6	99 12.0	45 10.0	13 8.5	302 12.4	17 22.4	2 5.7	1 11.1	–	20 16.1
Biface	N %	195 18.2	102 12.3	55 12.4	27 17.6	378 15.2	15 19.7	3 8.6	–	–	18 14.5
Burin	N %	2 0.2	2 0.2	1 0.2	–	5 0.2	–	–	–	–	–
Drill	N %	4 0.4	4 0.5	4 0.9	–	12 0.5	1 1.3	–	–	–	1 0.8
Graver	N %	5 0.5	3 0.4	3 0.7	3 2.0	14 0.6	2 2.6	–	–	1 33.3	3 2.4
Scraper	N %	11 1.0	11 1.3	9 2.0	1 0.7	32 1.3	1 1.3	3 8.6	1 11.1	1 33.3	3 2.4
Spokeshave	N %	–	–	–	–	–	1 1.3	–	–	–	1 0.8
Tabular Knife	N %	92 8.6	127 15.4	101 22.7	25 16.3	345 13.8	4 5.3	8 22.9	3 33.3	–	15 12.1
Bifacially Retouched Flake	N %	101 9.4	61 7.4	23 5.2	9 5.9	194 7.8	4 5.3	–	–	–	–
Unifacially Retouched Flake	N %	110 10.3	97 11.7	54 12.1	21 13.7	282 11.4	6 7.9	2 5.7	–	–	–
Utilized Flake	N %	367 34.3	289 34.9	119 26.7	45 29.4	820 32.9	24 31.6	13 37.1	3 33.3	–	–
Total Worn and Shaped Flakes	N %	1,032 96.4	795 96.1	414 93.0	144 94.1	2,385 95.6	75 98.7	32 88.6	8 88.9	2 66.7	117 94.4
Amorphously Flaked Cobble	N %	2 0.2	1 0.1	1 0.2	–	4 0.2	–	–	–	–	–
Chopper	N %	17 1.6	6 0.7	9 2.0	3 2.0	35 1.4	1 1.3	2 5.7	1 11.0	–	4 3.2
Total Edged Cobble Tools	N %	19 1.8	7 0.8	10 2.2	3 2.0	39 1.6	1 1.3	2 5.7	1 11.1	–	4 3.2
Hammerstone	N %	8 0.6	10 1.2	13 2.9	4 2.6	33 1.3	–	1 2.9	–	1 33.3	2 1.6
Net Weight	N %	2 0.2	–	–	–	2 0.1	–	–	–	–	–
Anvil	N %	3 0.3	5 0.6	1 0.2	1 0.7	10 0.4	–	–	–	–	–
Edge-Ground Cobble	N %	–	1 0.1	–	–	1 0.0	–	–	–	–	–
Pestle	N %	1 0.1	1 0.1	–	–	2 0.1	–	1 2.9	–	–	1 0.8
Milling Stone	N %	7 0.7	6 0.7	5 1.1	1 0.7	19 0.8	–	–	–	–	–
Hopper Mortar Base	N %	–	2 0.2	2 0.4	–	4 0.2	–	–	–	–	–
Total Non-Edged Cobble Tools	N %	19 1.8	25 3.0	21 4.7	6 3.9	71 2.8	–	–	–	–	3 2.4
Total	N	1,070	827	445	153	2,495	76	35	9	3	124

have higher percentages of cobble tools and lower percentages of flake tools in comparison to the Coyote Creek zones.

At 45-OK-2A, the low sample sizes make comparison among the zones more problematic than at 45-OK-2, but some of the same trends are observed. Projectile points are most frequent in the latest zone. Tabular knives decrease in frequency from older to younger zones. Choppers and hammerstones are relatively most frequent in the two oldest assemblages. The overall frequency of flake tools increases from Zone 4 to Zone 1, while the cobble tools decrease in frequency.

As is evident from the preceding section, the formal types are rather loosely and inconsistently defined. Degree of manufacture, type of wear, completeness, and overall shape were emphasized to different degrees in defining each specific class. We can, however, look at function at a lower scale, that of the worn area, and avoid the problems in the object type definitions. Tables 3-26 through 3-29 show the frequency of modes by zone for the dimensions kind of wear, location of wear, shape of worn area, and orientation of wear. Very few significant patterns are apparent. Of the kinds of wear, the frequency of feathered chipping increases from Zone 4 to Zone 1 (Table 3-26). The other modes vary randomly. One significant trend appears in the location of wear: wear on unifacial edges increases in frequency from Zone 4 to Zone 1 (Table 3-27). Also bifacial edges and terminal surfaces are relatively more common in Zones 3 and 4 than in Zones 1 and 2. The frequency of slightly convex wear decreases from Zone 4 to Zone 1, the other shape modes vary randomly (Table 3-28). Perpendicular orientation is least common in Zone 4 and increases to Zone 1 (Table 3-29).

The sample sizes are sufficiently large that the trends noted above must reflect some actual change in the functions being performed at the site. However, it is difficult to relate the isolated wear modes to specific activities. To some extent they mirror patterns we see at the object level (Table 3-25). Cobble tools--hammerstones and choppers in particular--are more common in the two oldest zones, thus accounting for the higher frequency of wear on terminal surfaces. The higher proportions of feathered chipping, wear on unifacial edges, and perpendicular orientation of wear in Zones 1 and 2 are probably related to the higher proportions of utilized flakes in the these zones, as these modes are predominant in utilized flakes. However, some differences may be better measured by the wear modes than by the formal types. Zones 3 and 4 are characterized by greater relative frequencies of wear on bifacial edges and of mildly convex wear. While the latter is commonly found in tabular knives--in high frequencies in Zones 3 and 4--the greater abundance of bifacial edge wear does not appear to relate to any particular artifact category. Bifacial edge wear is predominant only on bifacially retouched flakes and bifaces. Bifacially retouched flakes are lower in frequency in Zones 3 and 4, while bifaces are high in Zone 4 and low in Zone 3. Tabular knives are characterized by wear on the edges rather than bifacial wear. Evidently there is a higher frequency of bifacial edge wear in Zones 3 and 4 which is distributed across the various classes.

Table 3-26. Frequency of kind of wear modes by zone, 45-OK-2.

Attribute		Zone				Total
		1	2	3	4	
Abrasion/ Grinding	N	3	7	3	2	15
	%	0.3	0.8	0.7	1.3	0.7
Smoothing	N	115	192	83	35	425
	%	13.2	22.8	20.7	22.3	18.6
Crushing/ Pecking	N	41	35	29	7	112
	%	4.7	4.2	7.2	4.5	4.9
Feathered Chipping	N	483	426	179	70	1,158
	%	55.5	50.5	44.6	44.6	51.2
Feathered Chipping With Smoothing	N	13	16	6	5	40
	%	1.5	1.9	1.5	3.2	1.8
Hinged Chipping	N	194	150	96	33	473
	%	22.3	17.8	23.9	21.0	20.8
Hinged Chipping with Smoothing	N	20	17	5	5	47
	%	2.3	2.0	1.2	3.2	2.1
Hinged Chipping with Crushing	N	1	-	-	-	1
	%	0.1				0.0
Total	N	870	843	401	157	2,271

Table 3-27. Frequency of location of wear modes by zone, 45-OK-2.

Attribute		Zone				Total
		1	2	3	4	
Edge Only	N	113	189	78	34	414
	%	13.0	22.4	19.5	21.7	18.2
Unifacial Edge	N	637	548	254	98	1,547
	%	73.2	65.0	63.3	62.4	67.8
Bifacial Edge	N	78	66	38	16	198
	%	9.0	7.8	9.5	10.2	8.7
Point Only	N	6	1	4	-	11
	%	0.7	0.1	1.0		0.5
Point and Unifacial Edge	N	-	1	-	1	2
	%		0.1		0.6	0.1
Point and Two Edges	N	12	11	8	2	33
	%	1.4	1.3	2.0	1.3	1.4
Surface	N	8	10	4	2	24
	%	0.9	1.2	1.0	1.3	1.1
Terminal Surface	N	16	17	15	4	52
	%	1.8	2.0	3.7	2.5	2.3
Total	N	870	843	401	157	2,271

Table 3-28. Frequency of shape of worn area modes by zone, 45-OK-2.

Attribute		Zone				Total
		1	2	3	4	
Convex	N	130	158	71	25	384
	%	14.9	18.7	17.7	15.9	16.9
Concave	N	36	34	17	6	93
	%	4.1	4.0	4.2	3.8	4.1
Straight	N	294	268	106	50	718
	%	33.8	31.8	26.4	31.8	31.6
Point	N	18	13	12	2	45
	%	2.1	1.5	3.0	1.3	2.0
Slightly Convex	N	278	282	142	58	760
	%	32.0	33.5	35.4	36.9	33.6
Slightly Concave	N	114	86	53	16	269
	%	13.1	10.2	13.2	10.2	11.8
Irregular	N	–	2	–	–	2
	%		0.2			0.1
Total	N	870	843	401	157	2,271

Table 3-29. Frequency of orientation of wear modes by zone, 45-OK-2.

Attribute		Zone				Total
		1	2	3	4	
Parallel	N	3	–	–	1	4
	%	0.3			0.6	0.2
Oblique	N	7	7	2	3	19
	%	0.8	0.8	0.5	1.9	0.8
Perpendicular	N	745	657	315	120	1,837
	%	85.6	77.9	78.6	76.4	81.0
Diffuse	N	5	4	6	–	15
	%	0.6	0.5	1.5		0.7
Indeterminate	N	110	175	78	33	396
	%	12.6	20.8	19.5	21.0	17.4
Total	N	870	843	401	157	2,271

BONE ARTIFACTS

A total of 169 bones modified by wear or manufacture were found at 45-OK-2. They are discussed below by object types, grouped into debitage, worn, and shaped categories. The artifact types are listed by zone in Table 3-30. Examples of bone artifacts are illustrated in Plate 3-8.

BONE DEBITAGE

Many of the modified bones are not tools; they are debitage resulting from the systematic reduction of bone for raw material and from further stages in the manufacture of tools.

The most common category of bone debitage is fractured long bone. These are split long bone shafts characterized by one or two wide, short flake scars originating from the outer surface of the bone and extending down the fractured edge. The flake scars appear to be associated with the immediate point of impact of the blow that split the bone. Most terminate in spiral fractures at each end. Several still have one epiphysis attached. These bones may have been split to obtain marrow, or to begin the reduction process for producing bone tools.

Five of the bone artifacts are modified only by lengthwise grooving. These are long bone shaft fragments which have been grooved lengthwise and then snapped when the groove was nearly completed. This process leaves long parallel incisions on the surface between the exterior and interior. Most of these are very long, nearly complete shafts, and two have epiphyses at one end. In these cases, the grooving goes through the articular end as well as the shaft. Only one of the pieces is grooved on both sides. An example is illustrated in Plate 3-8;s.

Five bone fragments have no modification other than striae on their surface. Two are irregular flat pieces of bone, the others are smaller fragments of long bone shafts. One has been grooved on both sides. They are included here because the prominence of the striations suggests that they have not been subsequently worn; thus, they are probably manufacturing debitage rather than tool fragments.

WORN BONE

A second category has been classified as "worn only." Systematically fractured bone occurs in many forms which can be used as tools without further modification. Fractured bone may have very sharp and hard edges, pointed splinters, and blunt rounded edges formed by spiral fractures. The tool types discussed are natural forms which have been only slightly modified before they were used.

Flaked long bones are the most common type of worn bone. Like objects in the fractured long bone category, these artifacts are long bone shafts split lengthwise, terminating in spiral fractures; they have few attached epiphyses. Unlike that of the fractured long bone, the flaking on the edges appears to be

KEY

Master Number:
Object Type:
Provenience/Level:
Zone:
Material:

	Master Number:	Object Type:	Provenience/Level:	Zone:	Material:
a.	1180	Round Unipoint	13S348W/50	3	Bone
b.	1792	Round Unipoint	23S372W/80/F19	2	Bone
c.	596	Harpoon Point	56S450W/20/F600	1	Bone
d.	578	Harpoon Valve	55S449W/20/F600	1	Antler
e.	2469	Flat Unipoint	43S373W/60	3	Antler
f.	77	Sawn Metapodial	38N14E/80/F18	2	Bone
g.	1528	Splinter Awl	44S390W/110	4	Bone
h.	27	Flat Point	40S376W/50	2	Bone
i.	1944	Needle	26S368W/60/F48	2	Bone
j.	1727	Blunt End Awl	21S373W/100/F65	2	Bone
k.	2083	Blunt End Awl	42S382W/50/F110	2	Bone
l.	1791	Flat Awl	23S372W/70	2	Bone
m.	2583 (top)	Rounded End Shaft	29S359W/110/F200	4	Bone
	2564 (bottom)		29S360W/100	4	Bone
n.	2704	Flaked Object	36S355W/20	1	Bone
o.	2848	Flaked Object	40S368W/70	3	Bone
p.	899	Tine Flaker	36S419W/140	4	Antler
q.	918	Wedge	37S418W/80	2	Antler
r.	1670	Wedge	45S384W/50/F110	2	Antler
s.	2311	Sawn Metapodial	31S369W/120	3	Bone

Plate 3-8. Illustrations of bone artifacts, 45-OK-2.

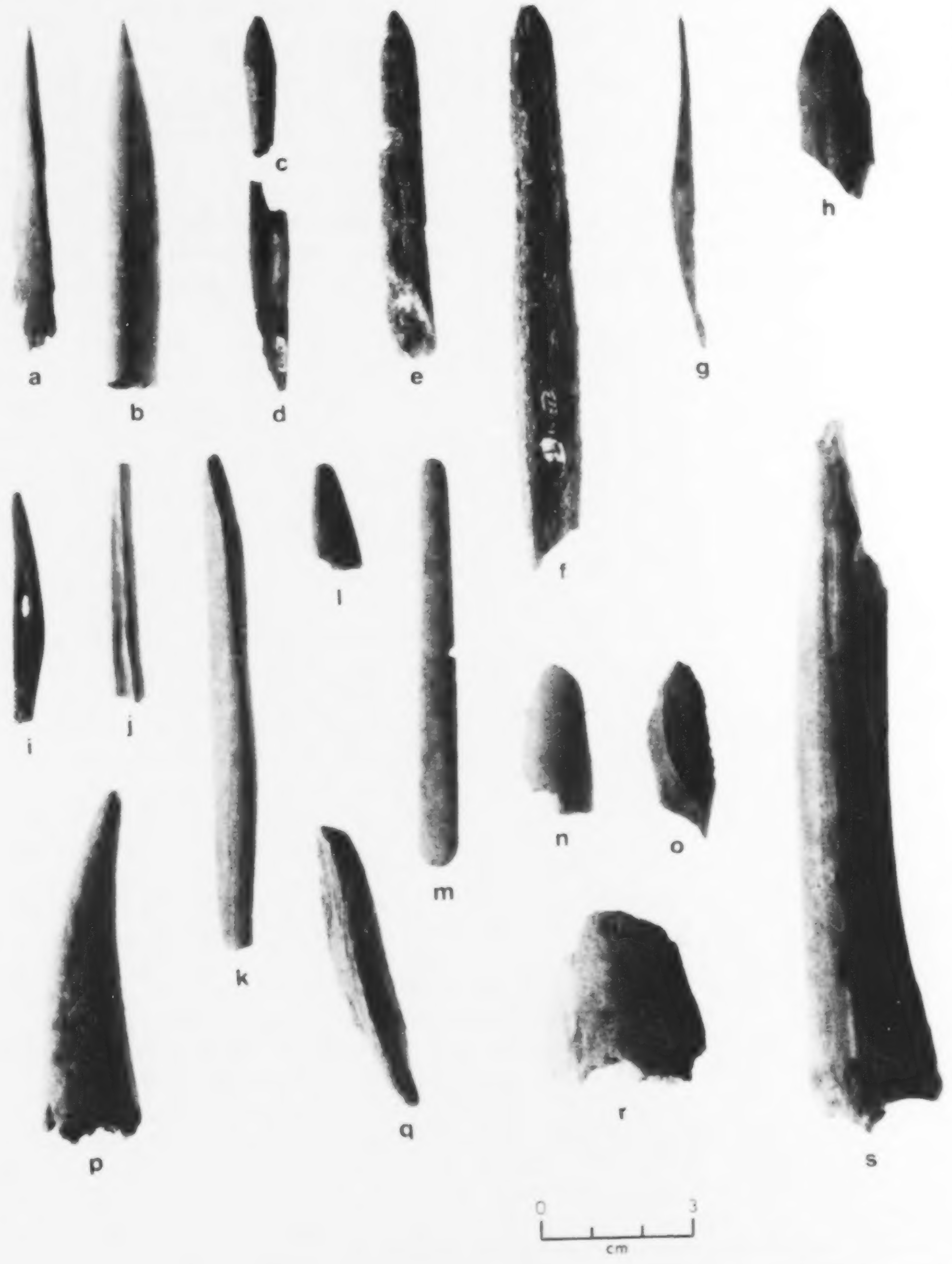
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Table 3-30. Bone artifacts by zone, 45-OK-2.

Category	Attribute		Zone 1	2	3	4	Total N
Debitage	Fractured Bone	N	5	12	6	19	42
		%	14.7	21.4	17.6	42.2	
	Grooved Bone	N	1	1	-	3	5
		%	2.9	1.8		6.7	
	Abraded Bone	N	1	2	2	-	5
		%	2.9	3.6	5.9		
	Total	N	7	15	8	22	52
		%	20.6	26.8	23.5	48.9	
Worn Bone	Flaked Bone	N	4	13	12	12	41
		%	11.8	23.2	35.3	26.7	
	Polished Surfaces	N	2	2	-	-	4
		%	5.9	3.6			
	Flat Points	N	2	4	-	1	7
		%	5.9	7.1		2.2	
	Antler Tine Tips	N	3	2	1	1	7
		%	8.8	3.6	2.9	2.2	
	Blunt Awls	N	2	3	4	1	10
		%	5.9	5.4	11.8	2.2	
	Flat Awls	N	-	4	-	2	6
		%		7.1		4.4	
	Splinter Awls	N	3	5	-	3	10
		%	8.8	8.9		6.7	
	Total	N	16	33	17	20	85
		%	47.1	58.9	50.0	44.4	
Shaped	Composite Harpoon Valve	N	2	-	-	-	2
		%	5.9				
	Composite Harpoon Point	N	1	-	-	-	1
		%	2.9				
	Flat Unipoint	N	-	-	1	-	1
		%			2.9		
	Other Points	N	-	2	2	1	5
		%		3.6	5.9	2.2	
	Wedge	N	1	1	2	-	4
		%	2.9	1.8	5.9		
	Blunt End Shafts	N	-	-	1	2	3
		%			2.9	4.4	
	Needle	N	1	1			2
		%	2.9	1.8			
	Incised Bone/ Bone Tube	N	6	4	3	-	14
		%	17.6	7.1	8.8		
	Total	N	12	8	9	3	32
		%	35.3	14.3	26.5	6.7	
	Zone Total	N	34	56	34	45	169

due to wear rather than fracturing. The flake scars are smaller, more numerous, and clustered. Some resemble hinge fractured flake scars on lithics, while others are smoothed or polished along the edges and ridges. Most extend from the edge toward the inside of the bone, though a few occur on the outside face. The wear on these artifacts is largely unifacial, but in some cases flakes extend to both sides. Six objects (two of which are illustrated in Plate 3-8;n,o) have chipping on a pointed or rounded end formed by a spiral fracture. One unique bone artifact, included in this category for want of a more appropriate one, is a split metapodial, with both epiphyses still complete and attached. No grooving is visible, but the edges are flaked in some areas. The inside edge has been abraded; in some places striae parallel to the length of the bone are visible. It has been included here because the edge flaking and the polish wear on the edge resemble the working of the other artifacts in the category. Yet it differs considerably in its overall configuration, in being worn on both edges, and in having abraded facets.

Four fragments of bone have a slight amount of polish on a surface but no other signs of use or manufacture. These are probably tool fragments.

Seven flat bone fragments with points at one end were placed in the flat point category. They differ from fragments with convex spiral fractures, which are common among the unmodified bones, in that they are symmetrical, but they do not appear to have been deliberately shaped. Both sharp and blunt points are present: the difference may be more the consequence of preservation than any difference in use. The flat points generally have polish on the points; the surfaces of some, however, are too eroded to permit detection of wear. An example is illustrated in Plate 3-8;h.

Seven antler tine tips were recovered. All but one is clearly modified by wear or manufacture at the tip. The modification ranges from crushing to polishing to "shaved" facets and nicks at the tip. Two, including the one illustrated in Plate 3-8;p, appear complete, bearing oblique grooves or adze marks at the proximal end at the point where they were cut from the antler. The others are much shorter and terminate in breaks.

Ten blunt end awls are included in the assemblage. They are long, narrow, and roughly parallel-sided bone fragments with terminating thick blunt ends created by oblique or spiral fractures. Whether the fractures were deliberate or accidental cannot be determined. Polishing wear occurs on the high spots and ridges of the shaft and ends. Several of the fragments have long parallel striae on one or both sides, indicating that the pieces were formed by grooving, and then splitting, a long bone. The striae may be partially obliterated by oblique abrasion facets or by polish. Abrasion striae also may be visible on other facets of the tool, but such minor manufacturing has not altered the irregular shape of the bone. Two examples of blunt end awls are illustrated in Plate 3-8;i,k.

The six artifacts in the flat awl category are fragments. One is a blunt, polished tip (Plate 3-8;l), the others are midsection fragments. They have elliptical cross-sections, although they may be made out of either an unsplit bone shaft of this shape or part of a long bone shaft worn to this shape. Some of the fragments exhibit oblique and parallel abrasion striae, but it appears these were the result of a smoothing process rather than an attempt to change the artifact's shape. They are polished, although on some the polish is limited to high spots.

Ten bones with thin, irregular points have been classified as splinter awls. Most of these are narrow long bone splinters; however, two wide flat irregular pieces, with thin projecting points at one end, are also included. The points may be slightly sharpened by abrasion but this is the only evidence of manufacture. The points show polish. A splinter awl is illustrated in Plate 3-8;g.

SHAPED BONE

Three fragments representing two composite harpoon valves were found in two units in Zone 1 of the Housepit 6 area. A midsection fragment with two sockets articulates with a spur fragment (Plate 3-8;d). The other is a body fragment with part of one socket.

The single example of a composite harpoon point is from Zone 1. A round, steep point ground on a shaft with a rectangular cross section (Plate 3-8;c), it is similar to harpoon points found in the Puget Sound area. The proximal end is missing. An abundance of striae running parallel to its length reveal it has been abraded all over.

One flat unipoint, rectangular in cross section, is fashioned of antler (Plate 3-8;e). In order to shape it, the artisan abraded all its surfaces and edges, including its blunt proximal end.

The other shaped points consist of very sharp, rounded points which have been ground at the tip and part way down the shaft. Several fragments in this category lack the point tip itself, but they are worked all over, and their tapering indicates that once they were pointed. Striae parallel the length of the artifacts. Two examples are illustrated in Plate 3-8;a,b.

Four of the artifacts are wedge fragments. One is a complete antler wedge tip, with crushing wear on the convex edge (Plate 3-8;r). Another is one half of a wedge tip split lengthwise (Plate 3-8;q). We have tentatively assigned two antler shaft fragments that lack tips or bits to this category.

Three objects, two of which articulate, are completely shaped shafts with rounded ends. Thin and rectangular in cross section, they have been split from rib bones. The entire shaft, including the interior cancellous portion, has been smoothed down, although the blunt ends do not seem to be worn. The single complete object formed by articulating two of the objects has two blunt ends (Plate 3-8;m). One end is slightly wider than the other, and so the sides taper a little. The other object consists of a midsection and one end. The two articulating pieces are assigned to two different zones, Zone 2 and Zone 4. They actually were found within a single unit level of one another in the complicated area at the base of Housepit 3 (assigned to Zone 2) where it cuts through Zone 4.

A single needle (Plate 3-8;l) was recovered in two articulating fragments. The shaft is rectangular in cross section, and thickest in the middle where an incised groove occurs. It tapers in both directions, ending in a blunt point at one end and a fracture at the other. Manufacturing striae are visible, both parallel to the long axis and oblique, overlain by light polish. The two fragments are from proveniences separated by two meters horizontally and 40 cm vertically, and assigned to two different zones. It is uncertain how and when the pieces were separated and which is the correct zone of origin.

We have made a single category of incised bone and bone tubes because of the co-occurrence of incising and tubular forms. The two complete examples are described first, as this provides the basis for identifying the many fragments.

Two of the objects in this category are highly polished tubes made of hollow long bone shafts (Plate 3-9;e,f). One is marked with three deep, concentric grooves around the middle as well as one long incised line, scored by incisions of two separate points to form two "X's" (Plate 3-9;f and Figure 3-7;a). Made of thick-walled bone which is triangular in cross-section, it is 3.8 cm long and 1.1 cm wide. One end is ground to a rounded lip, while the other still bears the remains of the groove used to detach the segment. The other tube is similar in size--3.5 cm long and 1.2 cm in diameter. The bone is circular in cross section, with thinner walls than the other tube, and the exterior is marked only with eight faint parallel incisions on one face (Plate 3-9;e and Figure 3-G;b). Both ends of the tube are ground down flat. These specimens are similar to the bone gaming stick reported by Grabert from the Fort Okanogan excavations (Grabert 1968a) although the latter is larger--4.75 cm long and 1.0 cm in diameter. He identified it as a bone gaming stick because it was similar to those reported by Spier 1938. If these bone tubes from 45-OK-2 are stick game bones, the smaller one would be the "white" or unmarked bone, because the fine incisions would not be visible at a distance, while the deeply grooved bone would be a "black" or marked bone. However, these tubes are considerably smaller than the stick game bones in current use (Larry Fredin, pers. comm.). Similar pieces from the mid-Columbia region are considered tubular bone beads (D.G. Rice, pers. comm.).

Another smaller tube is nearly complete, with an oblique fracture removing a portion of one rim. It has parallel manufacturing striae but is not polished or incised. The end was grooved for detachment and has not been smoothed over. This specimen probably represents an incompletely manufactured tube like those described above. In the other specimens, both fragmentary and complete, parallel and oblique manufacturing striae are visible beneath the polish. One small and highly polished, but unincised fragment, is a portion of a tube rim. Another rim fragment is incised. Two smaller pieces with incising and no rim may be portions of tubes, judging from their internal curvature. A highly polished lengthwise fragment of a bird bone shaft with parallel incisions at one end may be a portion of a tube. Seven distinctive incised pieces are fragments of yet another tube, although it cannot be completely reconstructed. The tube is actually a tooth--the thin, white enamel walls of an artiodactyl molar form the tube. A spiral incised groove runs the length of the tube.

The final two objects are incised but not parts of tubes. A flat piece of bone with incising on one polished surface is too thick and uncurved to be

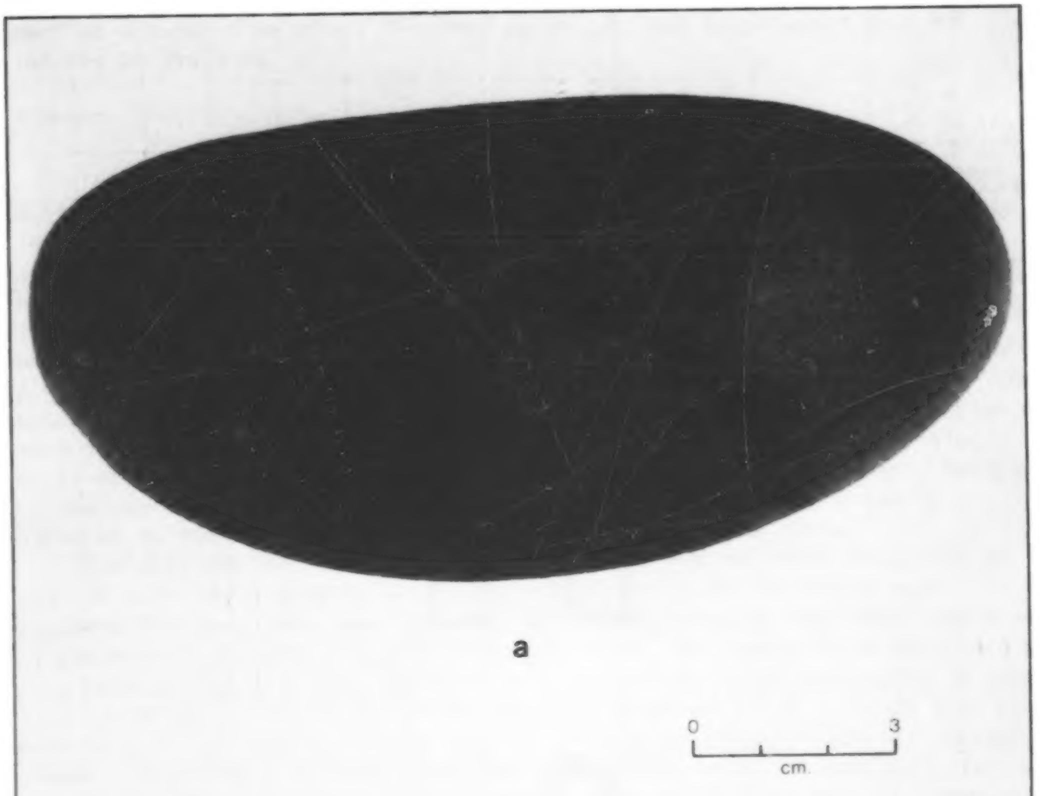
KEY
Master Number:
Object Type:
Provenience/Level:
Zone:
Material:

a.
3091
Pictograph
37S374W/90
3
Basalt

b.	c.	e.	f.
456	545	933	586
Needle or pin	Effigy tube	Gaming piece	Gaming piece
53S447W/40/F600	54S448W/10/600	48S393W/60	54S456W/20
1	1	2	1
Copper	Indeterminate stone	Bone	Bone

d.
684
Pendant
56S447W/10
1
Steatite

Plate 3-9. Illustrations of decorated objects, 45-OK-2.


a
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3
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b
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d
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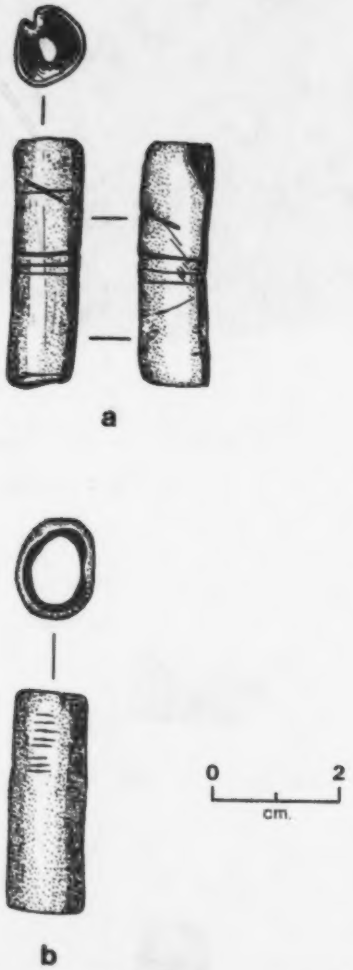


Figure 3-7. Incised bone tubes, 45-OK-2.

part of a tube. The other, a worked split rib, has a series of four X's incised on its side.

SUMMARY

Interestingly enough, the relative sizes each zone's bone assemblages differ from the relative sizes of the lithic assemblages. Zone 2 has the largest assemblage, followed by Zone 4, and then Zones 1 and 3. Very few clear trends or qualitative differences among the zones are apparent, partly because of the small sample sizes of individual artifact types. Zone 4 is distinctive in that it has the highest percentage of bone debitage (largely because of the high frequency of fractured only bone) and the lowest proportion of shaped tools. The other zones are similar to each other in the proportions of debitage, but Zone 2 is distinguished by a higher proportion of worn tools. Zone 1 has the highest percentage of shaped tools, including parts of composite harpoon valves which do not occur in other zones. Because of the smallness of the sample size, no historical significance can be attached to the limited occurrence of some of the shaped tools.

Overall, the zones are similar in that each has debitage categories as well as worn and shaped tools. The sheer diversity of the assemblages suggests that bone tool manufacturing was accomplished at the site. Two kinds of systematic reduction--grooving and fracturing by impact--were performed on long bone shafts, grooving and fracturing by impact. Ribs were split in half also, although we cannot determine the exact means by which this was done by examining the artifacts. Antler was cut with an implement which left oblique gouges. Many pieces of fractured bone were used without further modification, or with a little smoothing or sharpening. Other tools were made of fragments cut by grooving. Thin long pieces were made by grooving the shaft in two places. With a little retouching, these were used as awls; or they were extensively reworked into shaped artifacts.

Artifacts were sometimes shaped by abrasion. Characteristically, the abrasion on shaped and worn artifacts is parallel to their length. Occasionally, artifacts were abraded in an oblique direction, usually to smooth down grooving striae; in these instances, the artifacts were not finished by a subsequent finer grinding. No abrading stones were recovered though it may be that the stones used were relatively hard and were not scarred by use.

There are very interesting similarities and differences between this bone technology and that found on the west side of the mountains, as exemplified by the Duwamish site (45-KI-23) (Campbell 1981). The occupants at both sites grooved bone and antler to reduce them in a systematic manner. They also split and abraded ribs, although the frequency of artifacts made in this way is greater at the Duwamish site. Flaked long bone and fractured long bone (as described above) are less frequent at Duwamish, and a larger proportion of bone tools are shaped completely. Shaping techniques also differ somewhat. The occupants at Duwamish shaped their tools by abrading the bone on flat pieces of sandstone, producing multiple facets, each with striae oriented obliquely to the length of the artifact. Very few abrasion marks, other than those resulting from grooving, run parallel to the length. The abrasive material used at 45-OK-2 was coarser than the sandstone used at 45-KI-23: abrasion striae on 45-OK-2 bone artifacts are rougher, more irregular, and deeper. Many striae run parallel to the length of the artifact. Some 45-OK-2 artifacts were abraded in two stages, once with medium abrasive to rough out the shape, and then with a finer abrasive which smoothed out the facets. Some striae are identifiable as being produced by horsetails (*Equisetum*): different textures of horsetail may have been used for different stages of smoothing.

SHELL ARTIFACTS

The shell artifact collection at 45-OK-2 consists entirely of ornaments of imported marine shell, insofar as the shell is identifiable (Table 3-31). Three shell disc beads are manufactured from California mussel (*Mytilus californianus*), a bivalve which occurs in the intertidal zone along open coastline from Alaska to Baja California (Quayle 1960). *Dentalium pretiosum*, a scaphopod, inhabits open water from the low tide level to several fathoms in depth, from Alaska to Baja California (Morris 1966). The organism has an external tubular shell, tapered and slightly curved, which is open at both ends. Neither of the specimens from 45-OK-2 show any definite sign of modification. The longer specimen (Plate 3-10;v) is a complete or nearly complete shell--it is vertically divided into seven segments which appear to be natural. The other specimen is but a single segment. It may have been detached from the longer tube as both were found in Feature 9, the House F floor. A single example of Olivella (*Olivella* spp., a marine univalve) was found at 45-OK-2. It is a half shell, split lengthwise, with the spire section missing (Plate 3-10;w). The aperture end is unmodified, and it is not possible to tell whether the spire was cut or broken off. Two species of Olivella, *O. biplicata* and *O. boetica*, occur on sandy beaches on open coastlines and in sounds (Griffith 1967). The type of shell used for the other disc beads is unknown. There are so few shell artifacts that we cannot make meaningful comparisons among the zones, nor can we reconstruct the shell technology. It is likely that none of the shell artifacts were made at the site, but were imported in finished form.

Table 3-31. Frequency of shell artifacts by zone, 45-OK-2.

Object Type	Zone				Total
	1	2	3	4	
Olivella Bead	-	-	-	1	1
Dentalium Bead	2	-	-	-	2
Mytilus Bead	-	-	3	-	3
Other Disc Bead	-	1	2	2	5
Total	2	1	5	3	11

HISTORIC MATERIALS

The assemblage of historic materials--items of Euroamerican manufacture or material--from 45-OK-2 is summarized in Table 3-32. With a few exceptions, apparently due to disturbance, these materials occur in Zone 1. Historic materials were found both above and below the historic flood deposits, believed to date around A.D. 1900. Not all of the items can be unequivocally assigned to a pre- or post-1900 assemblage. The flood deposits are absent or thin in some parts of the site and historic materials may be mixed with older deposits. However, enough datable items occur above and below the flood deposits to establish that there are indeed two separable assemblages. Most of the items below the flood deposits are found in Houses 6, E, and F, where they are associated with typical stone and bone tools of Native American manufacture. Radiocarbon dates place these assemblages in the protohistoric and early historic period. Similar associations of glass, metal, and ceramics with Native American occupations are found outside the houses, in occupation surfaces and other suspected houses. The context of most of the pre-1900 assemblage is discussed in the chapter on houses.

There would have been no direct Euroamerican source of trade goods in the vicinity until after 1811 when Fort Okanogan was established. However, trade goods from other areas, where contact was earlier, were circulated in limited numbers in the Native American trade network between 1500 and 1811 AD. These comprised copper and iron salvaged from shipwrecks on the coast, and a few trade items such as beads introduced by traders on the coast towards the end of the period. Although the Pacific Coast and Puget Sound represented the closest source of trade goods, trading to the east, where contact was earlier, resulted in the influx of some goods. The most notable of these interior influences was the horse.

From 1811 to 1849, the fur trade companies were the primary source of trade goods. Between 1849 and 1865, the military presence in the area provided a source of Euroamerican items, as some Native Americans were hired as scouts. In the mining era and homesteading period which followed, the number of commercial sources of goods increased dramatically.

CERAMICS

The ceramic assemblage includes four sherds of a clay pigeon, found above the flood deposit, and 15 sherds of white ironstone associated with a pre-1900 occupation surface. One of the ironstone sherds bears a portion of a trademark with a lion, indicating it was manufactured in Staffordshire, England. Ceramics were not widely circulated until the army era, 1856-1870 (Chuck Hibbs, pers. comm.).

GLASS

Except for a few scattered pieces, most of the brown beverage bottle glass was found in a relatively small area north of Surface Depression F. It seems to have been a single bottle which was fragmented into many small

Table 3-32. Summary of historic materials, 45-OK-2.

Material	Functional Category	Description	Quantity
Ceramics	Domestic vessels	Ironstone plate sherds	15
	Other	Clay pigeon sherds	4
Glass	Vessels	Clear	20
		Lavender	8
		Brown	66
		Green	27
	Trade Beads	(see Table 3-GG)	6
Metal(copper)	Ornaments	Pin or needle	1
		Spacer beads	3
		Tinklers	2
	Scrap	Rectangular strips	5
Metal	Construction Fasteners	Round nails	20
		Square nails	10
		Barbed wire	2
		Other wire	8
		Fence staples	3
		Lock Washer	1
	Clothing Fasteners	Boot eyelet	1
		Undergarment hook and eye	2
		Suspender hook	2
		Button, 4-hole	3
		Button cover	1
	Ammunition	Bullet	3
		Shell	3
	Containers	Cans	13
		Bottle caps	3
		Jar lids	2
		Galvanized steel handle	1
		Powder flask	1
	Scrap	—	154
Shell	Clothing Fasteners	Button, 4-hole	1
Cloth	—	Woven, scrap	1
Leather	—	Scrap	1
Rubber	—	Scrap, red	50
Plastic	Clothing Fasteners	Buttons	2
	Photography	Mugboard letter	1
	—	Scrap	3

pieces. The nature of the fractures and the number of very small conchoidal flakes of this glass suggests that it was used as a shooting target. A number of shards of dark olive green glass, some of which have linear bubbles, were found in the area between Surface Depressions E and F. They all seem to be fragments of the same thick-walled bottle. Olive green thick walled beverage bottles were commonly used by the Hudson's Bay Company (HBC). Shards of lavender glass--discolored clear glass with manganese, dating from before 1920--were found in House E. One piece is a rectangular base, typical of what is commonly called a French square bottle. These were used as patent medicine bottles in the late 1800's. The bottle was very small and had a small neck, as indicated by the sharp interior curvature on several neck fragments. The amount of discoloration varies, and several pieces of clear glass of similar thickness and curvature are from the same bottle. A few isolated pieces of clear glass were found in other areas.

Eight glass trade beads or fragments were recovered, all in association with Native American houses or occupation surfaces (Table 3-33). The opaque blue Canton bead (Plate 3-10;a) larger than the others, is the size referred to in the HBC inventories as #1. The other two Canton blue beads (Plate 3-10;b-d), one of which consists of two articulating halves, are translucent and are size #2. The Canton black bead (Plate 3-10;h) also a size #2, is half a bead which has been burned, creating a metallic patina on the surface. The white seed bead (Plate 3-10;e) is of single-layered construction, which normally is later than the double-layered white on white bead (Chuck Hibbs, pers. comm.). The red faceted bead (Plate 3-10;f) is unusual because it is molded, rather than having ground facets. It is identical to a bead found at 45-OK-198, which is complete and has 15 facets (Chuck Hibbs/Jon Maas pers. comm.). Cornaline d'Aleppo beads, of which one was found (Plate 3-10;g) were made in Florence for several centuries. They were referred to as red and white beads by the fur trade companies who introduced them to this continent.

The bead assemblage as a whole is consistent with a date between 1800 and 1830, the time when these beads were most widely circulated, although some types were available earlier. The assemblage is not completely typical of this period, however. Size #3 Canton beads, normally the most common Canton beads, are absent from this assemblage. This is probably due to recovery bias, however, as the smaller beads would not have been easily caught in a 1/8 in screen. The frequency of seed beads at 45-OK-2 is undoubtedly much higher, as indicated by Osborne's recovery of a number of such small beads. The single example from this excavation was found in a botanical flotation sample, and it is clear that these would not have been found in the standard screen.

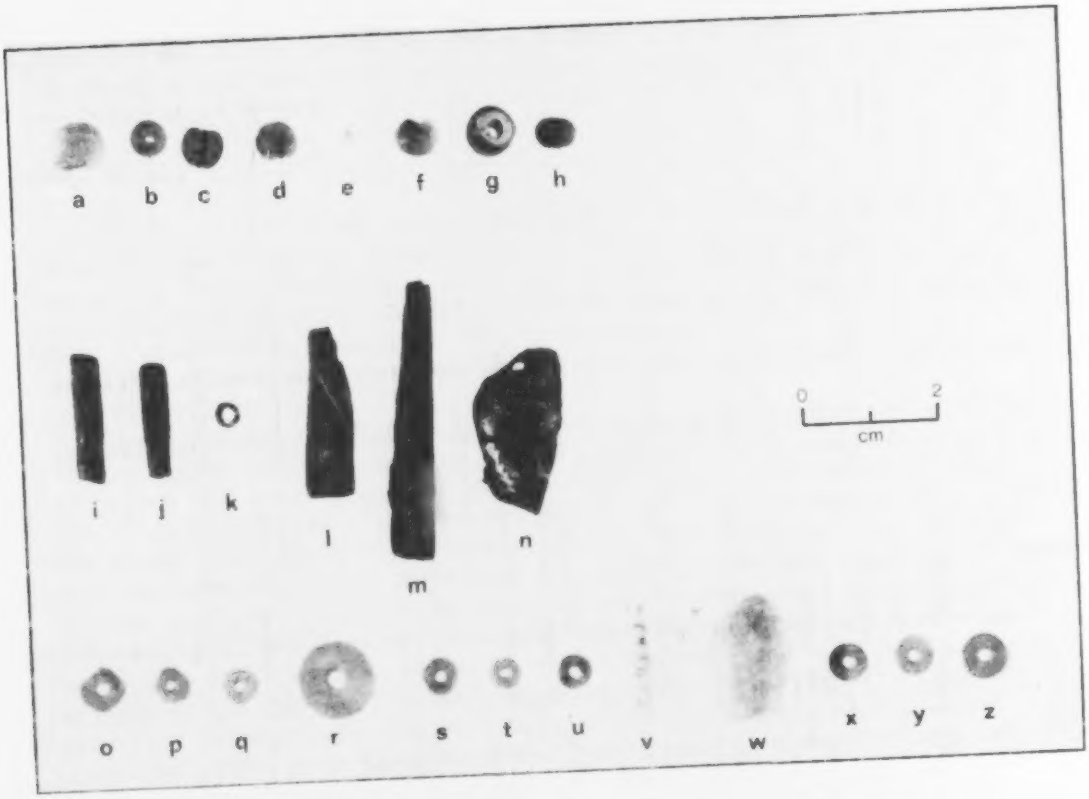
COPPER

The copper assemblage consists of several pieces of scrap, copper tinklers, copper spacer beads, and a clothes or hair pin or needle. The pin (Plate 3-9;b), from House 6, is made of hammered copper sheet. The distal shaft has been ground to a round shape with a point at the end. The surface has been polished. The proximal end is flat and is decorated with a series of incisions along both sides. The incisions were probably made with a steel

KEY
Master Number:
Provenience/Level:
Zone:
Material:

	Master Number	Provenience/Level	Zone	Material
a.	3137	41S372W/20	1	Glass Trade Bead
b.	2597	30S359W/40	1	Glass Trade Bead
c.	454	53S448W/40/F188,600	1	Glass Trade Bead
d.	532	50S450W/10	1	Glass Trade Bead
e.	546	54S448W/20/F600	1	Glass Trade Bead
f.	121	35S382W/30	1	Glass Trade Bead
g.	3136	40S374W/20	1	Glass Trade Bead
h.	3135	42S377W/20/F66	1	Glass Trade Bead
i.	741	48S388W/30/F9	1	Rolled Copper Bead
j.	1162	40S391W/30	1	Rolled Copper Bead
k.	170	35S397W/60	2	Rolled Copper Bead
l.	590	55S456W/30	1	Copper Tinkler
m.	590	55S456W/30	1	Copper Tinkler
n.	3157	41S378W/30/F188	1	Modified Metal Button Cover
o.	2507	44S373W/70	4	Shell
p.	174	34S397W/140	4	Shell
q.	1446	46S384W/60	1	Shell
r.	2127	28S370W/110	3	Calcite
s.	1674	45S384W/60	2	Shell (Mytilus)
t.	629	59S450W/70	3	Shell (Mytilus)
u.	1583	45S389W/70/F104,188	3	Shell (Mytilus)
v.	734	48S388W/20/F9	1	Dentalium
w.	2872	41S368W/80/F32	4	Olivella
x.	2150	28S370W/100	3	Calcite
y.	2323	30S367W/100	3	Calcite
z.	2322	30S367W/100/F27	3	Calcite

Plate 3-10. Illustrations of glass, metal and shell beads, 45-OK-2.


a
b
c
d
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z

Table 3-33. Description of trade beads, 45-OK-2.

Master#	Unit	Level	Feature	Color	Type of Manufacture	Descriptive Name	Diameter (mm)	Length (mm)	Association/Comments
121	35S382W	30	—	Translucent purplish-red (cranberry)	Mold faceted (15 facets)	——	Fragmented	Fragmented	Possible structure in depression above HP L. Broken, only small part hole present.
454	53S448W	40	600	Translucent bluish-green (aqua)	Spherical wire-wound	Canton blue	6.2	5.8	On HP 6 floor. Broken in half parallel to hole.
532	50S450W	10		Translucent bluish-green (aqua)	Spherical wire-wound	Canton blue	6.2	5.6	Just outside HP 6 wall. Broken in half parallel to hole. Articulates with #454
548	54S446W	20	600	Opaque white white	Short, single-layer, hot tumbled tube bead	seed bead	2.5	1.7	On HP 6 floor.
2597	30S359W	40		Translucent bluish-green (aqua)	Spherical wire-wound	Canton blue	5.5	4.9	Possible structure in depression above HP 2.
3135	42S377W	20	66	Opaque black with metallic oxides on surface (post-manufacture thermal alteration)	Oblate wire-wound	Canton	6.1	4.4	Floor of Surface Depression E. Burned and broken in half parallel to hole.
3136	40S374W	20		Translucent red-on-opaque white	Short, double-layer, hot tumbled tube bead	Cornaline d'Aleppo	6.9	5.8	Floor of Surface Depression E.
3137	41S372W	20		Translucent milky blue	Spherical wire-wound	Canton blue	8.7	6.0	Floor of Surface Depression F. Broken

tool, likely a knife. The incisions are deep V cuts, which have a few steps, but no stria along the edges. The copper spacer beads are parallel sided rolled copper beads. Two are long beads (Plate 3-10;i,j), and one is quite short (Plate 3-10;k). The copper tinklers (Plate 3-10;l,m) are also made of rolled copper, but these are rolled into a conical, rather than cylindrical shape, and are less well finished. The copper scraps are thin strips, thinner than the copper sheeting in use at the time. They may be cast copper, cut from a handle or something similar. Copper strips were circulated as trade items, or cut by the Native Americans themselves from copper kettles. All of the copper scraps were found in Surface Depression F, as well as several of the beads and tinklers.

OTHER METAL

A lock washer, three fence staples and pieces of barbed and other wire were all found above the flood deposits. Two of the fence staples were quite new and unrusted. Round nails of various sizes and types also were found above the flood deposits. Square nails were found below the flood deposits, mostly in Surface Depression E. The nails have not been individually identified by an expert, but they include both hand wrought and machine cut square nails.

The can assemblage includes one whole rectangular tobacco can which has not been dated. Another complete can is a condensed milk can with a hole in the top, a type used throughout the twentieth century. Three other complete cans, that is with walls and base and/or lid, are open top cans with crimped side seams. The remaining datable fragments, four bases or lids, and four wall fragments with side seam and/or rim, are from the same type of can. Open top cans were first made in 1902, but were not common until 1922 (Fontana and Greenleaf 1962:73). Many of the miscellaneous metal scraps are fragments of tin cans which lack rims, seams, or other diagnostic characteristics. Three bottle caps and two jar lids were found above the flood deposits. All are relatively modern types, dating since the 1920's. A strip of corrugated galvanized steel, also found above the flood deposit, appears to be a handle from a tub or similar container.

A powder flask (Plate 3-11;a) was found in the Surface Depression E house. It is a two piece seamed flask made of ferrous metal, of a type dating to the late 1800's.

Three sew-through S buttons (Plate 3-11;i-k) were found below the flood deposits. These buttons were probably fabric covered, and were used on undergarments. The Hudson's Bay Company inventories refer to them as brace buttons. Two small metal rivets also were found in association with the Native American occupation.

One of the most striking items is a military button cover which has been altered into a pendant or tinkler (Plate 3-10;n; and Figure 3-8). It is a thin gilded piece of metal made to cover a two or three piece hollow shanked button such as a Saunder staff button. The design is an American eagle holding an olive branch in one talon and a sheaf of arrows in the other; the breast is formed of a shield with the letter I, which stands for Infantry.

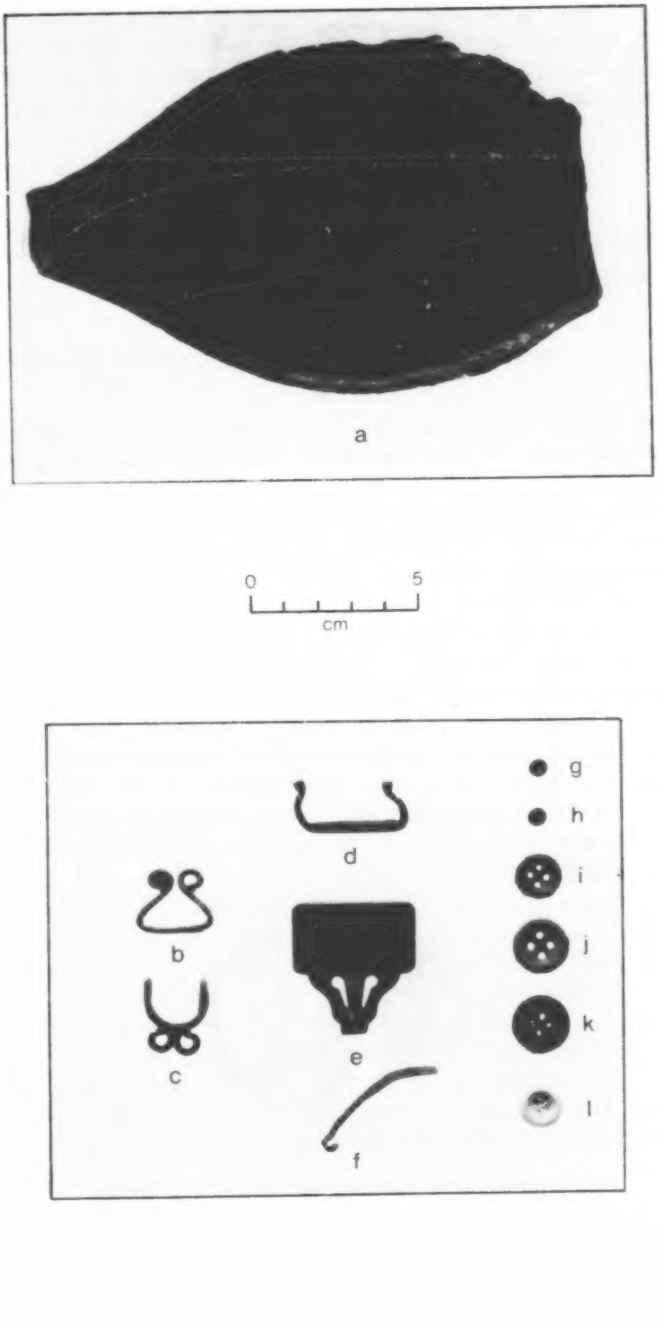
KEY
Master Number:
Object Type:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.
3146	3145	3144	3155
Powder flask	Suspender hook	Suspender hook	Belt buckle
44S375W/10	34S376W/10	34S377W/10	27S342W/20
1	1	1	1
Metal	Metal	Metal	Brass

e.	f.	g.	h.
3154	3153	3152	3151
Belt buckle	Belt buckle tongue	Button	Button (back)
43S377W/10/F4/66	34S376W/10	38S376W/20/F199	33S413W/10
1	1	1	1
Metal	Metal	Metal	Metal

i.	j.	k.	l.
3148	3150	3149	3147
Button	Button	Button (back)	Button
45S377W/20/F74	23S372W/30	40S393W/20/F188,199	25S371W/30
1	1	1	1
Metal	Metal	Metal	Shell

Plate 3-11. Illustrations of historic artifacts, 45-OK-2.


a
0
5
cm
g
h
d
i
b
j
c
e
k
l
f

This type of military button was in use during the Civil War era and was probably not available in this area until the arrival of the army.

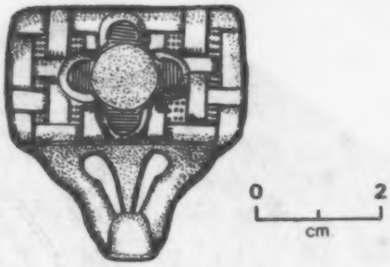


Figure 3-8. Pendant made of military button cover, 45-OK-2.

The cover has been folded diagonally and near the top a hole has been punched through the back with an awl. The hole pierces the tip of the eagle's left wing (facing the eagle), and is off-center relative to the original design. However the hole is centered relative to the folded object so that it would hang properly from the hole, indicating that the folding is a deliberate modification. It is similar in size and shape to the copper tinklers.

Other metal clothing fasteners include two suspender hasps. One is brass, similar in shape to a belt buckle (Plate 3-11;d). The words PATENT 1855, are stamped on the back. The other is square, with a spring catch (Plate 3-11;e and Figure 3-9). It is machine stamped from nickel steel sheet metal with plating of another material, and a machine stamped design. This form of manufacture dates it to the late 1800's. A few shreds of cloth are still attached. A large hook and eye (Plate 3-11;b,c) were found near each other outside Surface Depression E. These are undergarment fasteners dating from the late 1800's.

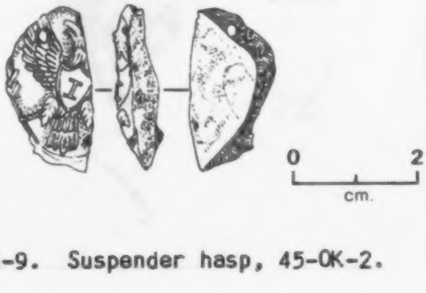


Figure 3-9. Suspender hasp, 45-OK-2.

Ammunition includes an array of shells and bullets of types that have been in use for long periods of time. None can be assigned definitely to either assemblage. Depth cannot necessarily be considered an indicator for the slugs, because they could penetrate the ground when shot.

A decorated ferrous metal object of unknown function was found (Plate 3-11;f). It is similar in shape to a belt buckle tongue; however, the asymmetry of the design--consisting of hatchmarks along one edge--seem inconsistent with this.

SHELL

Shell includes a single four-holed flat shell button (Plate 3-11;l) which has not been dated stylistically but is associated with a Native American occupation surface.

OTHER

Several items of plastic and scraps of red rubber are part of the post-1900 assemblage.

SUMMARY

Items definitely attributable to the post-1900 assemblage include round nails, fence staples, wire, tin cans, brown and green beverage bottle glass, clear glass, a few items of plastic, scraps of red rubber, clay pigeon fragments, bullets and shells, bottle caps, jar lids, a galvanized steel handle, and a lock washer. The debris is limited to that associated with ranching activities such as fencing, and casual use by fishermen, hunters, and archaeologists. There is none of the domestic trash which would be associated with a homestead.

By contrast, the pre-1900 assemblage is definitely a domestic assemblage, dominated by items of personal clothing or decoration. These include metal and shell buttons, a button cover altered to a pendant, glass trade beads, copper beads, a copper pin, undergarment fasteners, and suspender fasteners. Non-clothing items include an olive green beverage bottle, a patent medicine bottle, square nails, and a powder flask. The copper scraps indicate that copper was being worked at the site, the material being traded in the form of strips. The copper tinklers, beads, and pin were probably made at the site. Most of the historic items associated with the Native American occupation date between 1849 and 1900. The pre-1830 period is represented only by the copper scraps and the trade beads. Gun flints, ceramic pipes, lead shot, and mirror glass which also characterize trade good assemblages of this period are lacking.

STYLISTIC ANALYSIS

The stylistic analysis includes three parts. The first is actually a description of individual art objects rather than an analysis. It is followed by actual stylistic analysis in which stylistic classes are presented and their representation through time examined. Beads and projectile points are the only two artifact categories which occur in sufficient numbers and with sufficient variability to warrant quantitative stylistic analysis.

The most singular artifact from 45-OK-2 is a zoomorphic tube from House 6, Zone 1 (Plate 3-9;c). (It was recorded as an indeterminate object type and is so listed in previous tables.) It is a flaring hollow tube of an unknown brown stone, with a finely granular ground mass with larger crystalline inclusions, carved in the shape of a stylized animal, and then carefully polished. The "snout" of the animal is a thin walled tapering tube. Short ear-stubs occur toward the back of the creature's "head." Behind the ears, the tube constricts slightly, to form a" neck," then flares again to end abruptly in a flat plane. Here the wall is much thicker. An oval hole is carved on the underside of the tube "neck." Another hole, much smaller and rougher, occurs above this, behind the ears. Because of its irregular edges and the thinness of the tube walls here, it is assumed to be accidental. Tribal elders consider the artifact the mouthpiece of a flute; the deliberate hole in the "neck" of the tube -- most unlikely for a pipe -- bears out this judgment.

One of the most unusual artifacts at 45-OK-2 is a cobble with a pictograph, recovered from Zone 3 in 36S375W, Area 4 (Plate 3-9;a). A rounded granite cobble, it measures 14.0 x 6.5 x 4.0 cm. A section has spalled off one side, and the pictograph, a stylized animal, is painted in red pigment on the other surface. A single horizontal line represents the body, and two vertical lines at either end, the legs. At one end the horizontal line swerves slightly upward, suggesting a head, while at the other end the line extends beyond the vertical lines of the back legs to suggest a tail.

In spite of the fact that only two legs are shown, the painting seems to depict a large mammal, such as a deer or dog. Most of the animals illustrated by Leen for the project area are clearly quadrupeds -- that is, all four legs are shown -- or a very different animal such as a bird or fish. One pictograph from 45-OK-170, however, is a horned or antlered animal for which only two legs are shown (Field No.14, Leen 1984). The body is rounder, however, as it is outlined by a top and bottom line. Leen classifies this as a quadruped. A similar pictograph was found at 45-OK-234. It also consists primarily of a horizontal bar for a body, and two lines for legs, but its head and tail are more fully represented, and it may be horned or antlered (Field No.4, Leen 1984).

BEADS, PENDANTS, AND OTHER ORNAMENTS

The "pendant" or hanging, ornaments from 45-OK-2 are listed in Table 3-34 by zone, and illustrated in Plates 3-10 and 3-12. They total 67, a large enough sample size to permit some consideration of the historicity of types.

Although the historic buttons could possibly have functioned as pendant ornaments, they are not included here. The remains of thread on one shell button indicated that it had been sewn on in the conventional manner.

The stone disc beads (Plate 3-12;aa-ff,hh,jj-oo) are thin and pierced by a hole that is small in relation to the diameter of the bead. Though uniform in size, they vary from round to square and rectangular in plan view, and most are irregular in shape. Most, too, are made of a platy material that may be slate or shale; a few are made of a more uniform material such as basalt. Those of platy material are slightly thinner, on the average, than the others, and are more irregular in shape. These were apparently cut in relatively square shapes from slabs of the the parent rock. They were probably drilled then strung and ground as a group, resulting in the uneven grinding that is manifest in irregular facets. The manner by which the blanks of the other stone beads were cut is less certain. As the material would not necessarily lend itself to being split into thin sheets, they may have been formed in some other way.

Table 3-34. Bead types by zone, 45-OK-2.

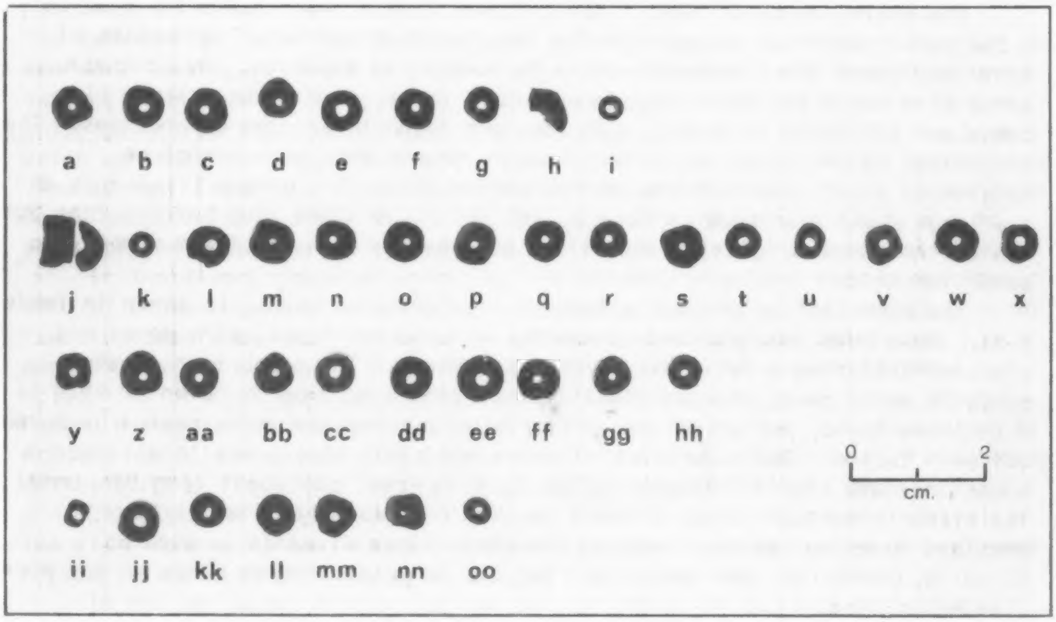
Material	Bead type	Zone				Total
		1	2	3	4	
Stone	Disc	8	13	12	6	39
	Ring	1	2	-	1	4
	Pendant	1	-	-	-	1
Shell	Disc	-	1	5	2	8
	Dentalium	2	-	-	-	2
	Olivella	-	-	-	1	1
Metal	Copper Tube	3	-	-	-	3
	Copper Tinkler	2	-	-	-	2
	Pendant	1	-	-	-	1
Glass	Trade	7	-	-	-	7
Total		25	16	17	10	68

Compared to the stone ring beads (Plate 3-12;gg,ii), the discs are both thicker, and have larger holes, relative to their diameters. One, in Zone 2, is considerably larger than the other three.

The shell disc beads (Plate 3-10;o-u,x-z) include both those of *Mytilus californianus* and unidentified shell. They are slightly smaller than the stone discs, but relatively uniform in size, with the exception of one very large disc (Plate 3-10;v) from Zone 3.

KEY	Master Number	Provenance/Level:	Zone:	Material:
a.	190	38S384W/40	1	Indeterminate stone
b.	18	33S385W/30	1	Basalt
c.	55	35S381W/30	1	Indeterminate stone
d.	2	32S385W/10	1	Basalt
e.	304	34S385W/30	1	Indeterminate stone
f.	103	35S383W/30	1	Indeterminate stone
g.	46	34S380W/20	1	Basalt
h.	1384	48S387W/20	1	Indeterminate stone
i.	434	40S409W/30	1	Indeterminate stone
j.	1547	44S380W/50	2	Indeterminate stone
k.	3086	38S373W/40	2	Indeterminate stone
l.	314	34S385W/70	2	Basalt
m.	48	34S380W/80	2	Basalt
n.	311	34S385W/80	2	Basalt
o.	161	34S387W/50	2	Basalt
p.	82	34S383W/80	2	Basalt
q.	164	34S387W/70	2	Basalt
r.	110	36S383W/80	2	Indeterminate stone
s.	171	36S387W/80	2	Basalt
t.	43	34S381W/70	2	Basalt
u.	173	36S387W/80	2	Basalt
v.	431	37S380W/50	2	Indeterminate stone
w.	378	35S3[illegible]60	2	Indeterminate stone
x.	2284	41S378W/80	2	Indeterminate stone
y.	33	33S385W/50	3	Basalt
z.	29	33S385W/90	3	Basalt
aa.	30	33S385W/80	3	Basalt
bb.	14	32S385W/100	3	Basalt
cc.	28	33S385W/90	3	Basalt
dd.	33	33S385W/110	3	Basalt
ee.	1140	48S381W/80	3	Indeterminate stone
ff.	27	33S385W/80	3	Basalt
gg.	16	32S385W/80-110	3	Indeterminate stone
hh.	1073	38S420W/10	3	Basalt
ii.	2880	40S368W/110	4	Indeterminate stone
jj.	1787	42S380W/120	4	Indeterminate stone
kk.	326	34S385W/120	4	Basalt
ll.	357	34S384W/110	4	Indeterminate stone
mm.	44	34S381W/100	4	Basalt
nn.	37	33S385W/130	4	Basalt
oo.	1220	47S422W/120	4	Indeterminate stone

Plate 3-12. Illustrations of stone beads, 45-OK-2.


a
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z
aa
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cc
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gg
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ii
jj
kk
ll
mm
nn
oo
0
2
cm.

The Dentalium and Olivella shells already have been described. These are assumed to have been used as beads.

The steatite pendant (Plate 3-9;d) is trapezoidal in shape, with the two diverging sides being the longest. A hole is drilled near the narrow end. All of the surfaces and edges have been ground and polished. A series of equidistant parallel incisions, are visible on one edge. They become shallower towards the proximal end and then disappear. Two grooves have been cut in the pendant, one on either surface. Both grooves are deep and slightly wavy, extending from just below the drilled hole to the other end of the pendant.

The glass beads (Plate 3-10;a-h), metal pendant (Plate 3-10;n), copper tubes (Plate 3-10;i-k), and copper tinklers (Plate 3-10;l-m) were described in the section on historic materials.

The distribution of bead types by zones (Table 3-34) indicates that only a few bead types have chronologically limited distributions. Ornaments of metal and glass are limited strictly to Zone 1, as expected. By contrast, stone disc beads and shell disc beads occur in all four zones. Stone ring beads are not found in Zone 3, but they are found in all the other zones. The limitation of Dentalium and Olivella beads to one zone each cannot be considered significant because of the sample size. The unique items such as the large shell disc bead in Zone 3, and the large stone ring bead in Zone 2, may be more chronologically sensitive, but there are insufficient numbers to establish this.

The distribution of bead material, regardless of shape, is shown in Table 3-34. Zone 1 has the greatest diversity of material types, with metal and glass constituting a full half of the assemblage. The proportion of stone beads to shell beads changes steadily from Zone 4 to Zone 2. Even if this is a reliable trend, preservational differences between the zones cannot be ruled out as a factor. The occurrence of stone and shell disc beads in all four zones indicate stylistic conservatism in this area from about 4000 B.P. until the historic period. Using grouped samples from all the sites, it may be possible to establish that some of the other types of beads -- such as Olivella, Dentalium, and the large ring and large shell disc beads -- are more limited in time.

PROJECTILE POINTS

The purpose of stylistic analysis of projectile points is to identify morphological traits and combinations of traits which have specific temporal distributions, or reflect distinct geographic traditions. Types with demonstrated historic significance then can be used as a relative dating tool. A number of such historic types have already been developed for various regions of the Plateau. However, the existing typologies have some drawbacks. Some types were defined on the basis of small assemblages which incorporated little variability. In addition, the types are not always clearly defined and the terms applied inconsistently in different studies. Because our project has recovered a very large assemblage of projectile points, and a large number of radiocarbon dates, we have an opportunity to evaluate independently the historic types and to contribute new information and refinements.

Consequently, an intensive analysis of projectile point styles was undertaken. It is described briefly below, as an introduction to the discussion of the projectile point assemblages from 45-OK-2 and 45-OK-2A. For a complete description of procedures and results see the summary report (Lohse 1984g).

The first step in the analysis was to develop an independent morphological classification of projectile point styles found within the project area. Eleven morphological traits known to be chronologically sensitive in the Plateau region--**blade-stem juncture, outline, stem edge orientation, basal edge shape, blade edge shape, cross section, serration, edge grinding, basal edge thinning,** and **flake scar pattern**--were selected as classificatory dimensions. Intersection of the first four, with some collapsing, defines 18 separate morphological types (Figure 3-10). The other seven dimensions, and metric data obtained by digitizing the point outlines, can be used to describe the points more fully or to identify variants within the type categories. The temporal span of these types in the project area, as currently known, is shown in Figure 3-11. The temporal distribution was extrapolated from directly associated radiocarbon dates and from the general dates of occupations containing these points. For point types lacking firmly dated contexts in the project area, we rely on outside sources for approximate time spans. The solid lines indicate the presumed temporal range of the type. Occurrences outside these ranges are so rare that they are probably due to cases of postdepositional mixing of points with later or younger deposits.

In the second stage of analysis, the projectile points were classified into 22 established Plateau historic types (Figure 3-12). This enables us to readily compare our projectile point assemblages with those from other excavations and allows us to compare the two systems of classifications. A collection of 700 typed specimens from well dated contexts at sites from the Fraser River to the Snake River and from the Dalles to the Libby Reservoir in Montana was digitized so that metric traits could be calculated. After metric definitions of the historic types were derived by statistical techniques, our projectile points were assigned to these types using discriminant analysis. The distribution of the historic types by phases is shown in Figure 3-13, and Figure 3-14 illustrates their utility as phase markers.

In the following discussion, we look at the distributions of both the morphological and historical types by zone at 45-OK-2 and 45-OK-2A, and we also cross-correlate the two classifications. Several assumptions about projectile point styles are invoked. In theory, projectile point styles are alternate forms of projectile points which are functionally equivalent. The choice of shape is dictated by cultural tradition, and a given style is popular for a limited length of time. Not only is the distribution of the style continuous in time, but the style exhibits a single peak of popularity, relative to other styles. Because projectile point styles have limited but continuous temporal distributions, they can be used as dating tools in the manner of index fossils. In this method of dating, the time span of the style is determined from dated contexts; an association in which the style occurs is assumed to fall within this time span. Use of this strategy generally encourages researchers to attempt finer and finer discriminations of projectile point morphology to get shorter and shorter time spans. The

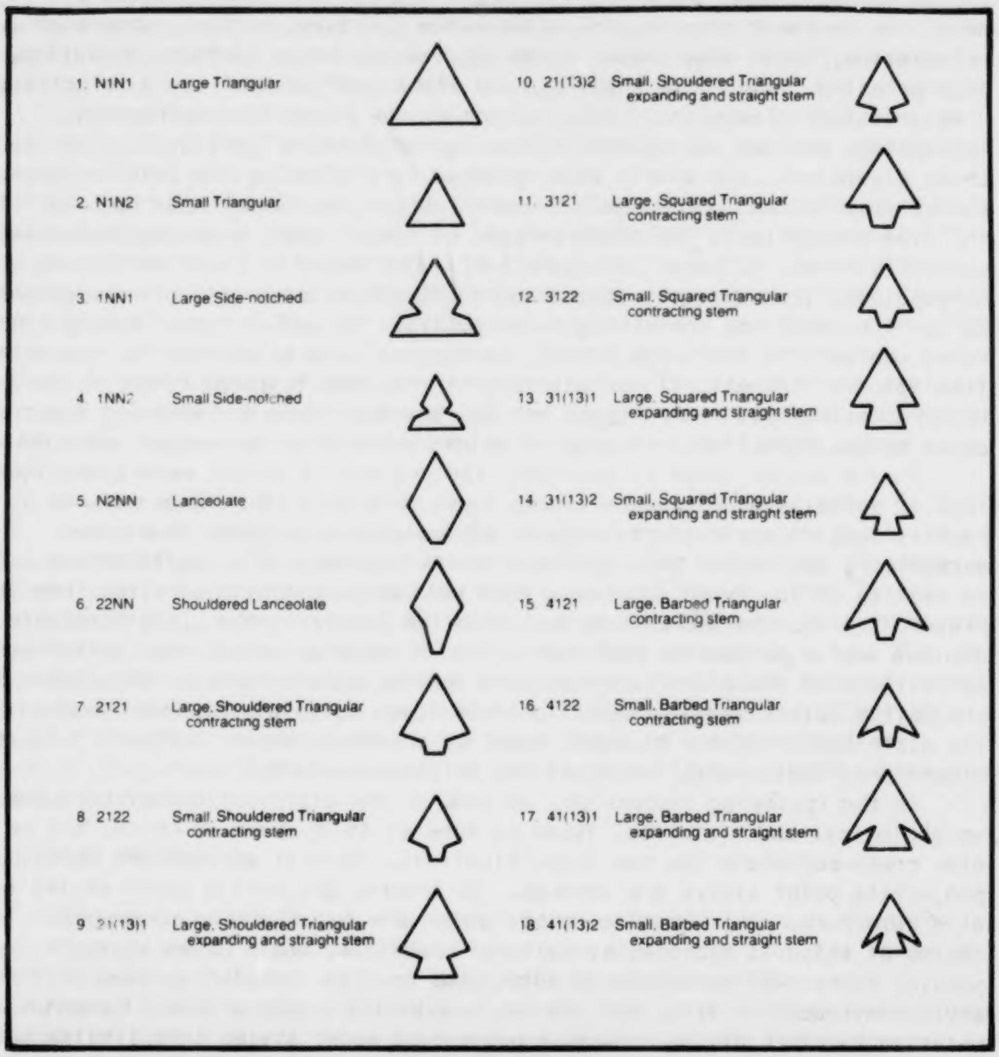

1. N1N1 Large Triangular
2. N1N2 Small Triangular
3. 1NN1 Large Side-notched
4. 1NN2 Small Side-notched
5. N2NN Lanceolate
6. 22NN Shouldered Lanceolate
7. 2121 Large, Shouldered Triangular contracting stem
8. 2122 Small, Shouldered Triangular contracting stem
9. 21(13)1 Large, Shouldered Triangular expanding and straight stem
10. 21(13)2 Small, Shouldered Triangular expanding and straight stem
11. 3121 Large, Squared Triangular contracting stem
12. 3122 Small, Squared Triangular contracting stem
13. 31(13)1 Large, Squared Triangular expanding and straight stem
14. 31(13)2 Small, Squared Triangular expanding and straight stem
15. 4121 Large, Barbed Triangular contracting stem
16. 4122 Small, Barbed Triangular contracting stem
17. 41(13)1 Large, Barbed Triangular expanding and straight stem
18. 41(13)2 Small, Barbed Triangular expanding and straight stem

Figure 3-10. Morphological projectile point type classification.

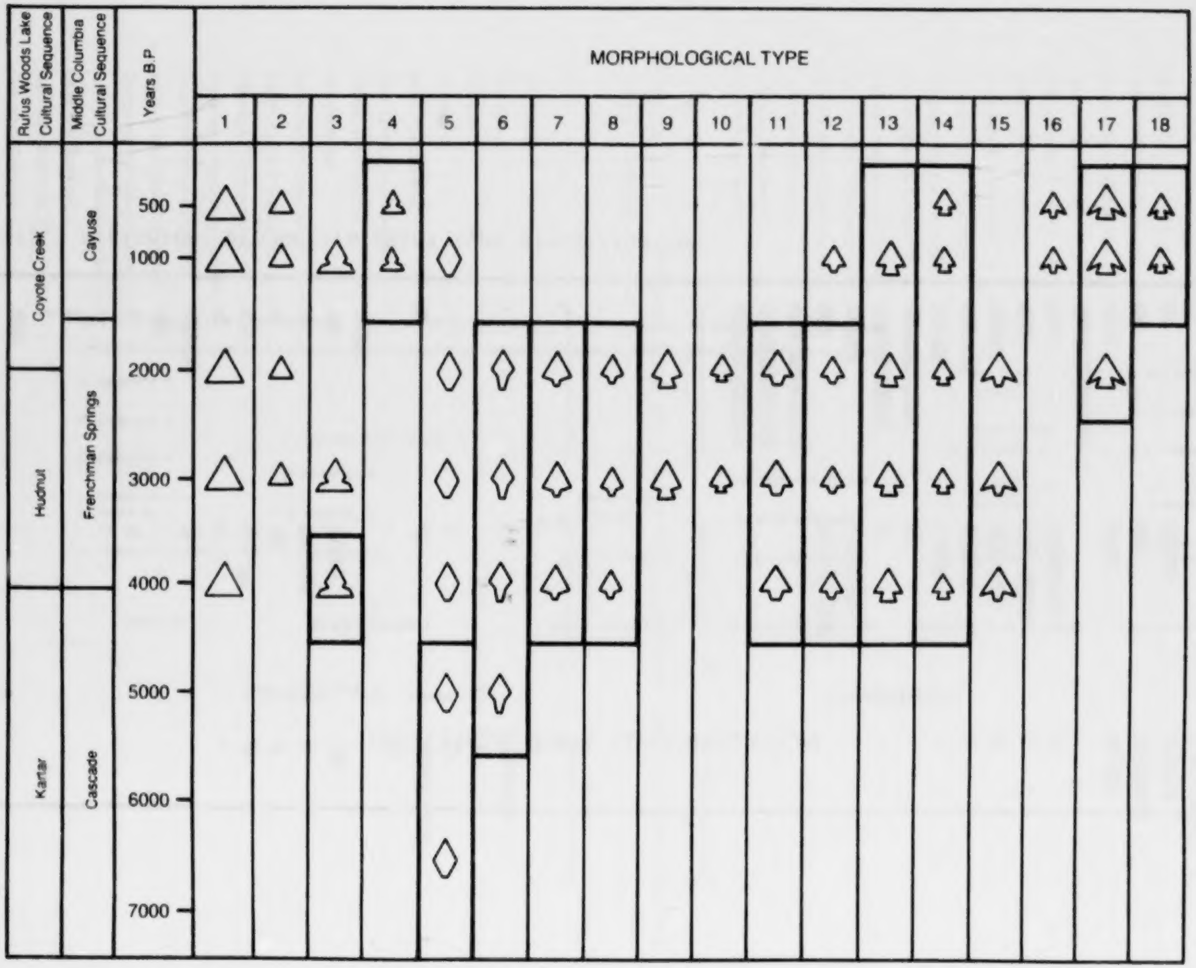


Figure 3-11. Temporal distribution of morphological projectile points types in the project area.

HISTORICAL TYPE CLASSIFICATION

DIVISION	LANCEOLATE		TRIANGULAR			
SERIES	SIMPLE	SHOULDERED	SIDE-NOTCHED	CORNER-REMOVED	CORNER-NOTCHED	BASAL-NOTCHED
TYPE	11 LARGE LANCEOLATE	12 LIND COULEE	41 COLD SPRINGS	51 NESPELEM BAR	61 COLUMBIA A Corner-notched	71 QUILOMENE A Basal-notched
	15 WINDUST C Contracting base	13 WINDUST A	42 PLATEAU Side-notched	52 RABBIT ISLAND A	62 QUILOMENE Corner-notched	72 QUILOMENE B Basal notched
	21 CASCADE A	14 WINDUST B		53 RABBIT ISLAND B	63 COLUMBIA B Corner-notched	73 COLUMBIA STEM A
	22 CASCADE B	31 MAHKIN SHOULDERED				74 COLUMBIA STEM B
	23 CASCADE C				64 WALLULA Rectangular stemmed	75 COLUMBIA STEM C

Types are numbered consecutively within formal series: a two-digit code indicates the approximate temporal sequence of defined series and types

Type names are those most commonly applied. Mahkin Shouldered and Nespelem Bar are types defined for the Rufus Woods Lake project area

Figure 3-12. Historical projectile point type classification.

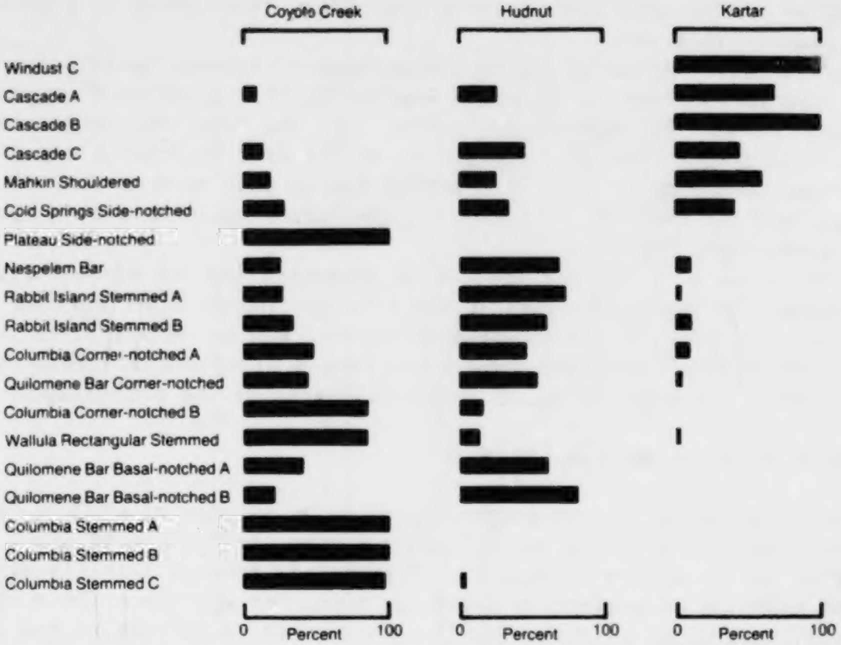


Figure 3-13. Proportions of historic projectile point types across all phases.

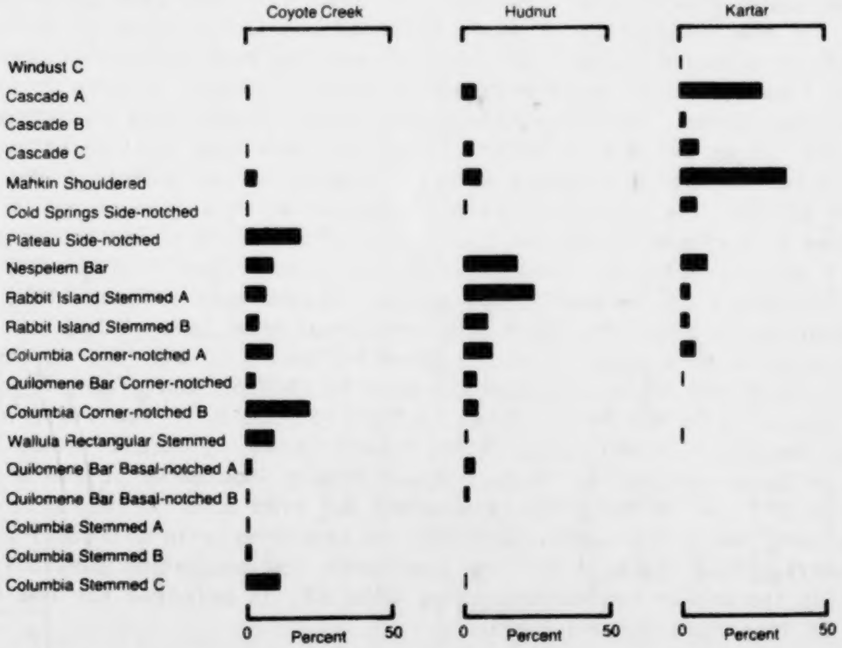


Figure 3-14. Proportions of historic projectile point types within phase.

information on the distribution of morphological types shown in Figure 3-11 can be used in this way.

An alternate method of dating assemblages--frequency seriation--is based on the observation that the relative popularity of a given point style follows a unimodal curve. The assemblage, rather than the type, is emphasized, and the relative frequencies of different types are used to order a set of assemblages chronologically. This method may be used to order assemblages which contain the same set of types and are indistinguishable chronologically by the index fossil method.

A third use of these assumptions is in evaluating the historicity of point types. If the point types do not have continuous distributions in time and do not fit unimodal curves, several factors may be responsible: the types are not appropriate historical types, the sample sizes are so small that sampling error is interfering, or there is mixing of the assemblages.

Projectile Point Assemblage, 45-OK-2

The distribution of the morphological types by zone at 45-OK-2 is shown in Table 3-35, the distribution of historic types in Table 3-36 and a cross tabulation of the two in Table 3-37. Plates 3-13 through 3-15 illustrate selected examples of projectile points by zone. We will look first at the individual morphological types and their distribution to examine their usefulness as temporal markers.

Types 1 and 2, neither of which have any provision for hafting, are not finished projectile points. The small triangular forms, Type 2, probably are blanks for the manufacture of small side-notched points (Type 4), which they resemble in size and shape. They also follow the same pattern of occurrence as Type 4 points, being most abundant in Zone 1, present in Zone 2, and absent in the other zones. The large triangular forms, Type 1, may be blanks as well, for larger projectile points. They may have been used as knives, but there is no conclusive evidence of knife wear on either example. Because they are not points, the discontinuous distribution of this type is not a concern.

Zone 4 is characterized by the highest proportions of morphological Types 5, 6, 7 and 10, although these occur in all zones. Type 5 (lanceolate points) occur throughout all periods in the project assemblages although they are most common prior to 4500 B.P. Type 6 points (shouldered lanceolates) are slightly more common in this zone: they are dated between 5500 and 1500 in the project area. Types 7 and 10 fall within the 4500 to 1500 period. Thus the maximum range suggested by the point styles is 5500 to 1500 B.P. The historic types include Cascade A, Mahkin Shouldered, Rabbit Island A, Rabbit Island B, and Columbia Corner-notched A. Cascade A and Mahkin Shouldered points are most characteristic of Kartar phase components but also occur in Hudnut occupations, while the remaining types are characteristic of Hudnut phase components. Thus there is no strong evidence for occupation substantially predating the oldest radiocarbon date; 4000 B.P. is selected for the lower age limit of this zone (Figure 3-15).

Table 3-35. Distribution of morphological projectile point types by zone, 45-OK-2.

Zone	Radiocarbon Dates[1] (B.P.)	Estimated Age (B.P.)		Morphological Types																	Total
				1	2	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	<110 (not corrected)	50	N	1	5	23	1	1	2	2	2	4	2	-	5	16	1	1	2	16	84
	227 ± 80	500	%	1.2	6.0	27.4	1.2	1.2	2.4	2.4	2.4	4.8	2.4		6.0	19.0	1.2	1.2	2.4	19.0	
2	529 ± 89	2000	N	-	1	2	2	3	2	3	1	2	3	2	4	14	-	-	1	16	56
	1268 ± 95		%		1.8	3.6	3.6	5.4	3.6	5.4	1.8	3.6	5.4	3.6	7.1	25.0			1.8	28.6	
3	3066 ± 76	3000	N	1	-	-	1	3	3	4	1	1	5	8	5	1	-	-	1	-	34
			%	2.9			2.9	8.8	8.8	11.8	2.9	2.8	14.7	23.5	14.7	2.9			2.9		
4	3001 ± 95	4000	N	-	-	-	1	2	2	1	-	1	1	-	1	-	-	-	-	-	9
	3977 ± 153		%				11.1	22.2	22.2	11.1		11.1	11.		11.1						
	Total		N	2	6	25	5	9	9	10	4	8	11	10	15	31	1	1	4	32	183

[1] Only the youngest and oldest dates in each zone are shown.

Table 3-36. Distribution of historic projectile point types by zone, 45-OK-2.

Zone	Radiocarbon Dates[1] (B.P.)	Estimated Age (B.P.)		Historical Types[2]																	Total
				21	23	31	41	42	51	52	53	61	62	63	64	71	72	73	74	75	
1	<110 (not corrected)	50	N	-	1	1	1	24	2	4	3	5	1	17	11	4	-	-	1	4	79
	227 ± 80	500	%		1.3	1.3	1.3	30.4	2.5	5.1	3.8	6.3	1.3	21.5	13.9	5.1			1.3	5.1	
2	529 ± 89	2000	N	1	1	3	-	2	4	4	4	5	-	15	5	-	1	1	2	7	55
	1268 ± 95		%	1.8	1.8	5.5		3.6	7.3	7.3	7.3	9.1		27.3	9.1		1.8	1.8	3.6	12.7	
3	3066 76	3000	N	-	-	4	-	-	6	8	11	-	-	2	1	-	1	-	-	-	33
			%			12.1			18.2	24.2	33.3			6.1	3.0		3.0				
4	3001 ± 95	4000	N	2	-	1	-	-	-	4	1	1	-	-	-	-	-	-	-	-	9
	3977 ± 153		%	22.2		11.1				44.4	11.1	11.1									
	Total		N	3	2	9	1	26	12	20	19	11	1	34	17	4	2	1	3	11	176

[1] Only the youngest and oldest dates in each zone are shown.

[2] For key to type names see Figure 3-12.

Table 3-37. Cross tabulation of historic and morphological types, 45-OK-2.

Morphological Type by Projectile Point Type	Cascade A	Cascade C	Wahkin Shouldered	Cold Springs Side-Notched	Plateau Side-Notched	Nespelem Bar	Rabbit Island A	Rabbit Island B	Columbia Corner-Notched A	Quilomene Bar Corner-Notched	Columbia Corner-Notched B	Wallula Rectangular Stemmed	Quilomene Bar Basal-Notched A	Quilomene Bar Basal-Notched B	Columbia Stemmed A	Columbia Stemmed B	Columbia Stemmed C	Not Assigned	Total
0101 (Type 1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
0102 (Type 2)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	5	6
1112	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
1002 (Type 4)	-	-	-	1	23	-	-	-	-	-	1	-	-	-	-	-	-	-	25
0200 (Type 5)	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
2200 (Type 6)	1	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
2121 (Type 7)	-	-	-	-	-	8	-	1	-	-	-	-	-	-	-	-	-	-	9
2122 (Type 8)	-	-	-	-	-	7	-	3	-	-	-	-	-	-	-	-	-	-	10
2131 (Type 9)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
2111 (Type 9)	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-	-	-	-	3
2132 (Type 10)	-	-	-	-	1	-	-	-	3	-	2	-	-	-	-	-	-	-	6
2112 (Type 10)	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	2
3121 (Type 11)	-	-	-	-	-	2	6	3	-	-	-	-	-	-	-	-	-	-	11
3122 (Type 12)	-	-	-	-	-	-	6	4	-	-	-	-	-	-	-	-	-	-	10
3131 (Type 13)	-	-	-	-	-	-	-	-	4	1	1	1	-	-	-	-	-	-	7
3111 (Type 13)	-	-	-	-	-	-	5	-	2	-	1	-	-	-	-	-	-	-	8
3132 (Type 14)	-	-	-	-	-	-	-	-	-	-	22	1	-	-	-	-	-	-	23
3112 (Type 14)	-	-	-	-	-	-	1	-	-	-	-	7	-	-	-	-	-	-	8
4121 (Type 15)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
4122 (Type 16)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
4131 (Type 17)	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	4
4132 (Type 18)	-	-	-	-	-	-	-	-	1	-	7	6	-	-	1	3	10	1	29
4112 (Type 18)	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	-	3
Total	3	2	9	1	26	20	19	12	11	1	34	17	4	2	1	3	11	8	184

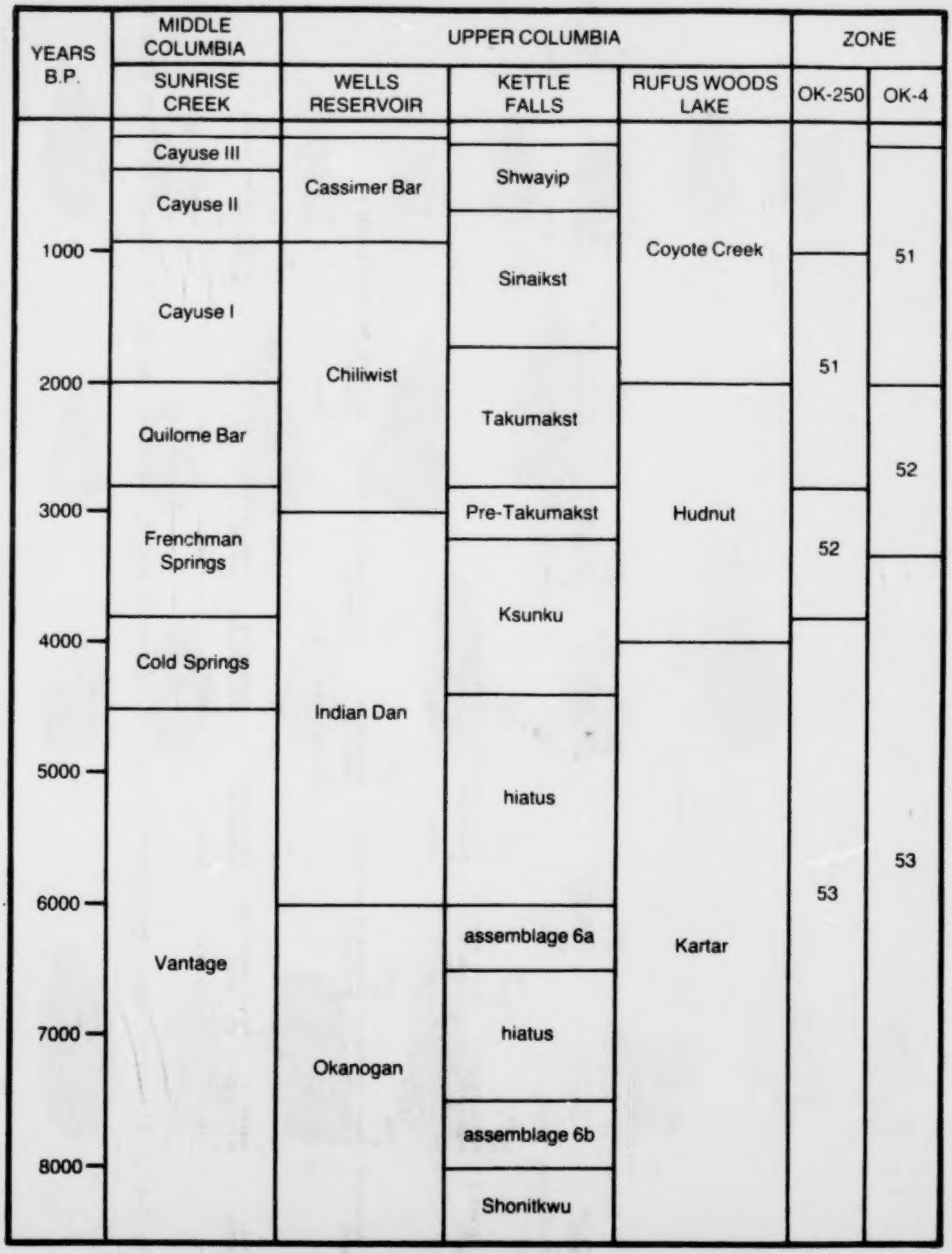

YEARS B.P.
MIDDLE COLUMBIA
UPPER COLUMBIA
ZONE
SUNRISE CREEK
WELLS RESERVOIR
KETTLE FALLS
RUFUS WOODS LAKE
OK-250
OK-4
1000
2000
3000
4000
5000
6000
7000
8000
Cayuse III
Cayuse II
Cayuse I
Quilome Bar
Frenchman Springs
Cold Springs
Vantage
Cassimer Bar
Chiliwist
Indian Dan
Okanogan
Shwayip
Sinaikst
Takumakst
Pre-Takumakst
Ksunku
hiatus
assemblage 6a
hiatus
assemblage 6b
Shonitkwu
Coyote Creek
Hudnut
Kartar
51
52
53
51
52
53

Figure 3-15. Estimated age of zones at 45-OK-2 and 45-OK-2A and relationship to regional chronology, adapted from Nelson 1969, Grabert 1968, Chance and Chance 1977, 1979, 1982.

KEY
Master Number:
Morphological Type:
Historical Type:
Provenience/Level:
Zone:
Material:

a.
1486
7
Nespelem Bar
46S391W/70
3
Fine-grained basalt

b.
2841
11
Nespelem Bar
41S365W/90
3
Opal

c.
2355
10
Nespelem Bar
47S376W/70
3
Opal

d.
2898
8
Nespelem Bar
20S356W/70/F28
3
Jasper

e.
1960
12
Rabbit Island B
27S369W/50
3
Jasper

f.
2786
12
Rabbit Island B
41S374W/60
3
Petrified Wood

g.
2478
12
Rabbit Island B
43S373W/70
4
Jasper

h.
912
11
Rabbit Island B
37S419W/100
3
Opal

i.
2847
12
Rabbit Island A
40S308W/70
3
Jasper

j.
2858
12
Rabbit Island A
40S358W/90
3
Jasper

k.
2356
13
Rabbit Island A
47S376W/70
3
Jasper

l.
3074
11
Rabbit Island A
35S375W/50
3
Jasper

m.
1209
11
Rabbit Island A
46S422W/80
3
Jasper

n.
1633
6
Mahkin Shouldered
19S370W/50
3
Opal

o.
1802
6
Mahkin Shouldered
40S389W/70
3
Jasper

p.
2138
13
Columbia Corner-notched B
29S371W/60
3
Opal

q.
2625
13
Nespelem Bar
34S360W/90
3
Petrified Wood

r.
1572
14
Wallula Rectangular-stemmed
45S389W/20
1
Opal

s.
2834
17
Quilomene Bar Basal-notched B
40S365W/70
3
Jasper

t.
351
5
Cascade A
34S384W/100
4
Jasper

u.
2448
6
Cascade A
43S374W/60
4
Opal

v.
3092
6
Mahkin Shouldered
37S W/100
4
Indeterminate

w.
349
7
Nespelem Bar
34S384W/100
4
Jasper

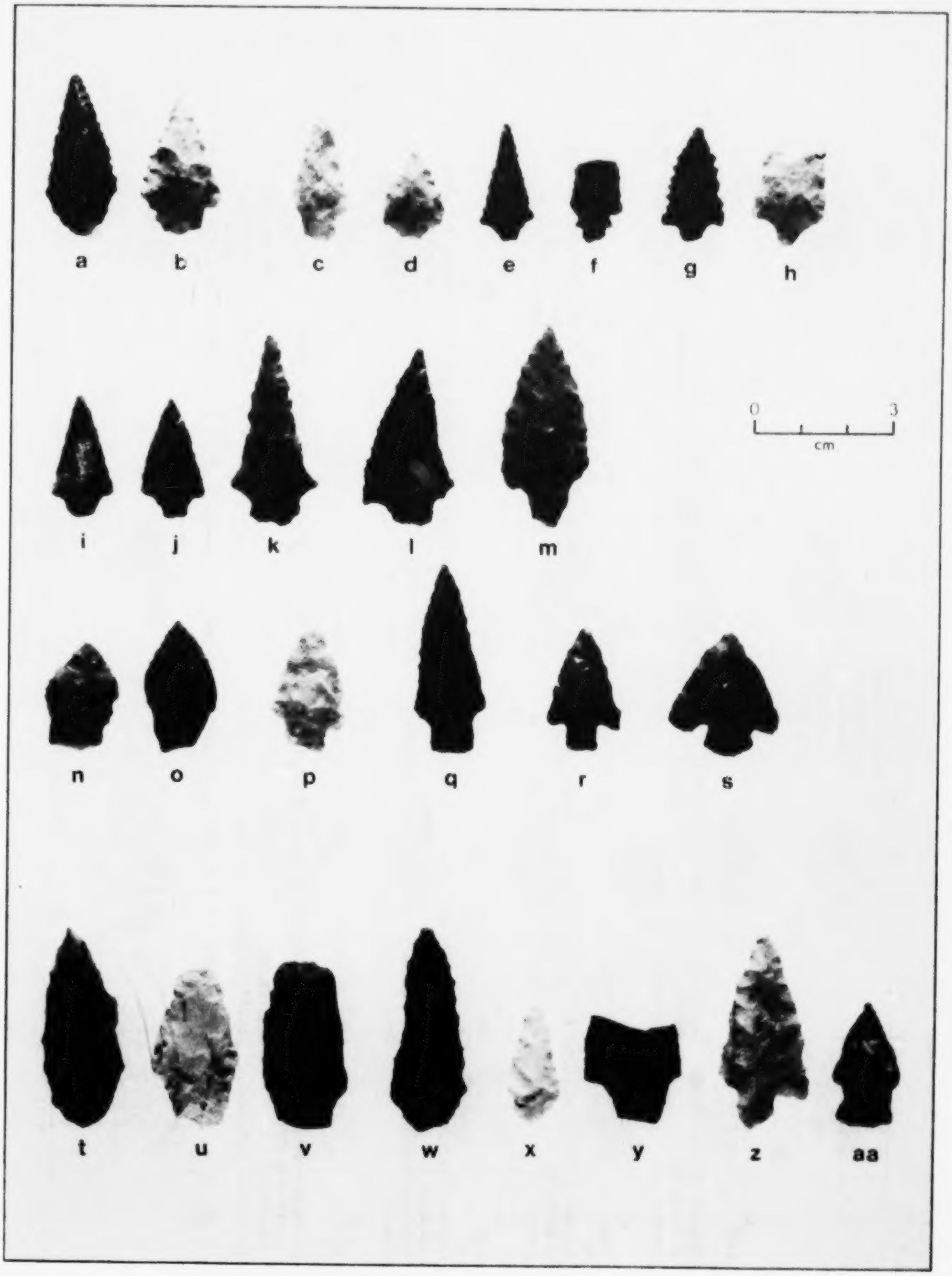
x.
2851
8
Nespelem Bar
40S368W/80/F32
4
Opal

y.
801
11
Nespelem Bar
81S541W/190
4
Jasper

z.
2481
13
Rabbit Island A
44S374W/50
4
Opal

aa.
210
10
Columbia Corner-notched A
46S401W/120
4
Jasper

Plate 3-13. Illustrations of projectile points, Zones 3 and 4, 45-OK-2 (except r, which is from Zone 1).


a
b
c
d
e
f
g
h
i
j
k
l
m
0
3
cm
n
o
p
q
r
s
t
u
v
w
x
y
z
aa

KEY

Master Number:
Morphological Type:
Historical Type:
Provenience/Level
Material:

a.
1432
4
Plateau Side-notched
47S387W/60
Jasper

b.
1467
5
Cascade C
46S389W/30
Chalcedony

c.
1633
6
Nespelem Bar
19S370W/50
Opal

d.
2076
6
Nespelem Bar
43S383W/60
Jasper

e.
3071
6
Nespelem Bar
35S375W/30
Basalt

f.
349
7
Nespelem Bar
34S384W/100
Jasper

g.
2814
7
Rabbit Island B
40S370W/30
Chalcedony

h.
1545
10
Columbia Corner-notched A
44S389W/40
Jasper

i.
1993
10
Rabbit Island A
43S385W/40/F125
Opal

j.
1534
11
Rabbit Island A
44S390W/40
Jasper

k.
3011
11
Rabbit Island B
21S356W/20
Jasper

l.
412
12
Rabbit Island A
36S385W/60
Chalcedony

m.
200
13
Columbia Corner-notched A
39S386W/50
Jasper

n.
1551
13
Wallula Rectangular-stemmed
44S389W/70/F104
Jasper

o.
138
14
Columbia Corner-notched B
33S413W/30
Opal

p.
2584
14
Wallula Rectangular-stemmed
29S359W/110/F200
Jasper

q.
1788
14
Columbia Corner-notched B
23S372W/60
Argillite

r.
1026
14
Columbia Corner-notched B
39S418W/60
Jasper

s.
920
14
Columbia Corner-notched B
37S418W/90
Jasper

t.
2771
17
Quilomene Bar basal-notched B
40S374W/30
Silicized Mudstone

u.
2353
18
Columbia stemmed B
47S376W/30
Petrified Wood

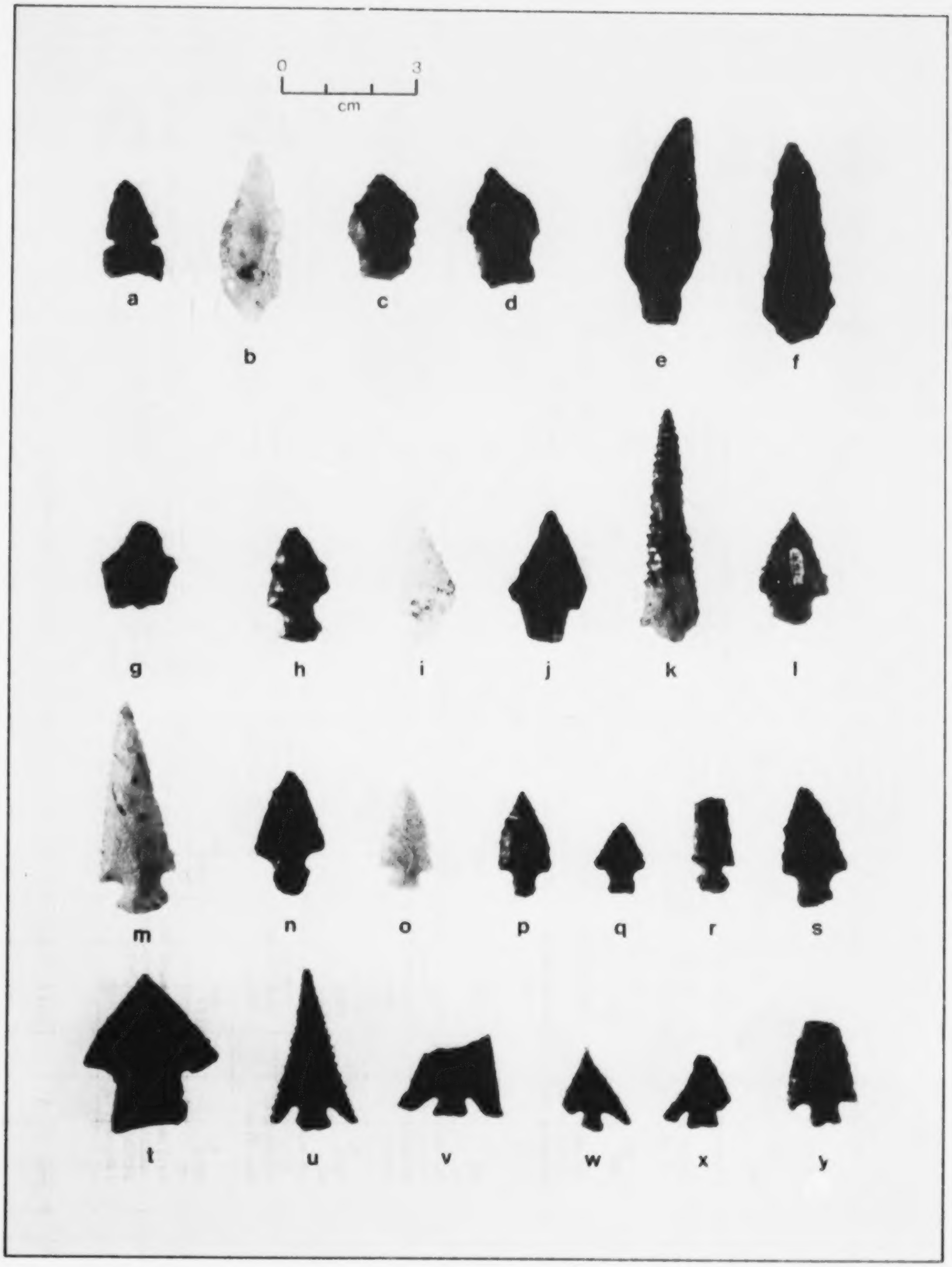
v.
2374
18
Columbia stemmed B
45S378W/50
Chalcedony

w.
1838
18
Columbia stemmed C
24S370W/60
Jasper

x.
773
18
Columbia stemmed C
87S574W/40
Jasper

y.
1151
18
Wallula Rectangular-stemmed
49S39W/40
Jasper

Plate 3-14. Illustrations of projectile points, Zone 2, (except f, which is from Zone 4), 45-OK-2.


0
3
cm
a
b
c
d
e
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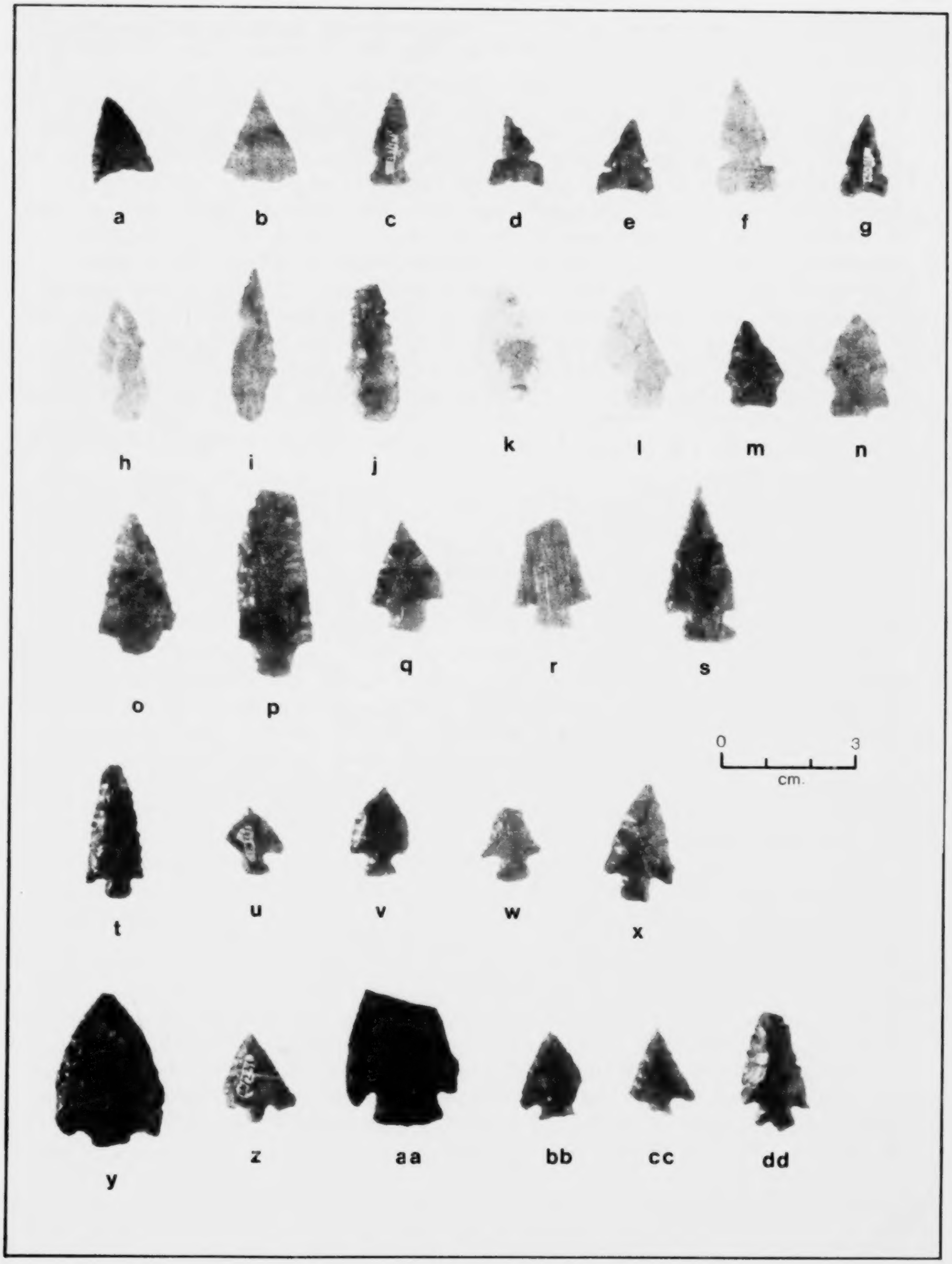
h
i
j
k
l
m
n
o
p
q
r
s
t
u
v
w
x
y

KEY
Master Number:
Morphological Type:
Historical Type:
Provenience/Level:
Material:

a.	2521	2	Unassigned	42S375W/30	Jasper
b.	2129	2	Unassigned	49S371W/10	Chalcedony
c.	2133	4	Plateau side-notched	29S371W/20	Jasper
d.	2888	4	Plateau side-notched	41S367W/30	Jasper
e.	1805	4	Plateau side-notched	41S389W/20/F888	Jasper
f.	644	4	Plateau side-notched	52S442W/10	Jasper
g.	1803	4	Plateau side-notched	40S388W/20/F888	Jasper
h.	831	5	Cascade C	84S544W/40	Jasper
i.	2101	6	Mahkin Shouldered	28S371W/20	Jasper
j.	1989	7	Nespelem Bar	43S385W/30	Opal
k.	2646	8	Nespelem Bar	39S358W/40/F199	Opal
l.	805	9	Columbia Corner-notched B	82S549W/30	Jasper
m.	937	10	Columbia Corner-notched A	49S393W/20	Jasper
n.	1349	10	Plateau side-notched	51S389W/30	Jasper
o.	2020	11	Rabbit Island A	27S367W/20	Jasper
p.	3060	13	Rabbit Island A	34S374W/10	Jasper
q.	735	13	Columbia Corner-notched B	48S388W/20/F9	Jasper
r.	429	13	Columbia Corner-notched A	37S385W/30	Petrified Wood
s.	1539	13	Columbia Corner-notched A	44S389W/20	Obsidian
t.	1603	14	Wallula rectangular-stemmed	18S370W/30	Jasper
u.	2381	14	Columbia Corner-notched B	32S371W/30	Chalcedony
v	1722	14	Columbia Corner-notched B	21S373W/50	Jasper
w.	1931	14	Columbia Corner-notched b	26S368W/0	Jasper
x.	1572	14	Columbia Corner-notched B	45S389W/20	Jasper
y.	2675	15	Quilomene Bar basal-notched	38S356W/40	Jasper
z.	231	16	Quilomene Bar basal-notched	52S440W/10	Jasper
aa.	1659	17	Quilomene Bar basal-notched	45S385W/40	Fine-grained basalt
bb.	1127	18	Wallula rectangular-stemmed	48S392W/20	Jasper
cc.	362	18	Wallula rectangular-stemmed	35S385W/30	Jasper
dd.	2988	18	Wallula rectangular-stemmed	20S356W/20	Jasper

Plate 3-15. Illustrations of projectile points, Zone 1, 45-OK-2.


a
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y
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aa
bb
cc
dd

Zone 3 is dominated by historic morphological Types 8, 11, 12, and 13. These all span the period from 4500 to 1500 B.P., although Type 13 points extend as well to historic times. The other point types, 5, 6, 7, 9, 10, and 14 also occur within this time range. Type 17 points are generally later in time than these other types, although they do extend back to 2500 B.P. The position of this point may have been affected by mixing: the frequencies do not follow a unimodal curve. The Zone 3 assemblage seems slightly less consistent when viewed via historic types. The dominant types, Rabbit Island B, Rabbit Island A, and Nespelem Bar are very characteristic of Hudnut components. However, the next most abundant type is Mahkin Shouldered, generally more common in Kartar phase assemblages. It is interesting that the frequency of Mahkin Shouldered points is even greater in Zone 3 than in Zone 4. The Quilomene Bar Basal-notched B is also common in Hudnut phase assemblages, but the Wallula Rectangular-stemmed point and the Columbia Corner-notched B point are generally associated with Coyote Creek assemblages. The latter are few in number and may represent mixing. They need not challenge either the dating of the zone or the general context of the point styles.

Zone 2 has a rather different type of assemblage. It is dominated by morphological types 14 and 18, which together constitute over 50% of the assemblage, and by historic types Columbia Corner-notched A and B, Columbia Stemmed C, and Wallula Rectangular-stemmed points. These point types clearly indicate a Coyote Creek phase, dating after 2000 B.P. There is a greater variety of other point types occurring in smaller numbers than in the previous zones. Some of these, such as Types 5, 6, and 7, are more commonly associated with older zones. Others, such as Type 4, are more commonly associated with younger zones. However, none of these points are necessarily out of context in an occupation dating between 2000 and 500 B.P. (Figure 3-15).

Zone 1 has a very similar set of point types to that of Zone 2, but the most abundant morphological type is Type 4, which corresponds almost exactly to the historic type Plateau Side-notched. Small stemmed points (Types 14 and 18) are less abundant than in Zone 2, but still make up much of the remainder of the assemblage. Wallula Rectangular-stemmed points are more common than in Zone 2 and Columbia Stemmed C and Columbia Corner-notched B are somewhat less common. Rabbit Island A and B, and the lanceolate point styles are more common than expected. The individual points clearly resemble points characteristic of much older time periods, yet their context is undoubted, as they occur in association with trade goods and Plateau Side-notched points. Most of these misplaced points come from the area between Surface Depressions E and F, where the Zone 3 and Zone 4 occupations were relatively close to the surface, and where there was considerable cultural activity, including excavation, in the upper zones. This area is also near the bank and it is possible that some of these older point styles were collected by the site occupants from the beach.

Projectile Point Assemblage, 45-OK-2A

Only 12 classifiable points were recovered from 45-OK-2A. The distribution of the morphological types by zone is shown in Table 3-38, and the distribution of historic types by zone in Table 3-39. Plate 3-16 illustrates all of the projectile points from the site, by zone. Except for Type 18, found in occupations dating from 1500 B.P. to the protohistoric period, the morphological types have very long time ranges and do not help us date the zones precisely.

The single point in Zone 3 is a shouldered lanceolate (Type 6), which extends back farther in time in the project area than any of the other types at 45-OK-2A (Figure 3-11). It is classified as a Windust C in the historic types, which is found in contexts dating prior to 4500 B.P. outside the project area. On the basis of this point it seems likely that the zone is older than any of the zones at 45-OK-2, and we assign it to the Kartar Phase (Figure 3-15).

The two projectile points recovered from Zone 2, present conflicting chronological information. One is a lanceolate (Type 5), which has also been classified as a Cascade A point. Type 5 points occur throughout time in the project area, but are most common before 4500 B.P. (Figure 3-11). Cascade A points are most characteristic of Kartar Phase assemblages. This would suggest a date before 4000 B.P. However, the other point is a small square-shouldered triangular point with contracting stem (Type 12): these occur only after 4000 B.P. in the project area. In the historic classification, it is Rabbit Island A, most common in Hudnut Phase occupations. Therefore, we assign this zone to the Hudnut Phase, 2000-4000 B.P. and cannot date it more closely. Type 5 is most abundant in Zone 4 at 45-OK-2 and Type 12 most abundant in Zone 3 at 45-OK-2, so it seems reasonable that Zone 2 at 45-OK-2A should span the same period as Zones 3 and 4 at 45-OK-2 (Figure 3-15).

The most common morphological type in Zone 1 is Type 18, which occurs in the project area between 1500 B.P. and historic times. Type 14 is the next most common: this type of point is found over a wide time range--4500 B.P. to historic time--but is more common after 2000 B.P. There is but a single example of Type 16, a style known only from contexts later than 1500 B.P. A single Type 8 point was found: these points are known only from contexts older than 1500 B.P. In combination, these point styles suggest occupation beginning prior to 1500 but continuing after that time. The absence of side-notched points suggests termination before 500 B.P. (Figure 3-15). The Type 5 point does not add any useful chronological information. The historic types provide comparable chronological information. Columbia Stemmed A and C, and Columbia Corner-notched B--the most common types--are most characteristic of Coyote Creek assemblages in the project area. The Quilomene Bar Basal-notched A and Rabbit Island B points are most characteristic of Hudnut assemblages, but do occur in Coyote Creek components as well.

KEY
Master Number:
Morphological Type:
Historical Type:
Provenience/Level:
Zone:
Material:

a.
43
17
Quilomene Bar Basal-notched A
8N8W/Surface
-
Chalcedony

b.
36
4
Plateau Side-notched
Testing
-
Chalcedony

c.
23
5
Cascade C
19N104E/50B
1
Chalcedony

d.
127
8
Unassigned
35N29E/30/F17
1
Jasper

e.
131
14
Columbia Corner-notched B
36N30W/10/F9
1
Jasper

f.
92
14
Columbia Corner-notched B
35N14E/60
-
Chalcedony

g.
139
16
Columbia Stemmed C
35N30W/20/F9
1
Chalcedony

h.
121
18
Columbia Stemmed A
35N29E/20/F17
1
Jasper

i.
138
18
Columbia Stemmed A
35N30E/20/F9
1
Jasper

j.
75
18
Columbia Stem C
36N14E/30/F12
1
Jasper

k.
122
18
Quilomene Bar Basal-notched
35N29E/20/F17
1
Jasper

l.
29
12
Rabbit Island A
19N104E/90B
2
Chalcedony

m.
178
5
Cascade A
45N14E/80/F19
2
Jasper

n.
53
6
Windust C Concave base
25N211E/50
3
Jasper

Plate 3-16. Illustrations of projectile points, 45-OK-2A. (Objects **a, b, c,** and **l** are from testing. Zones for 18N104E were assigned by correlation with nearest salvage unit.)

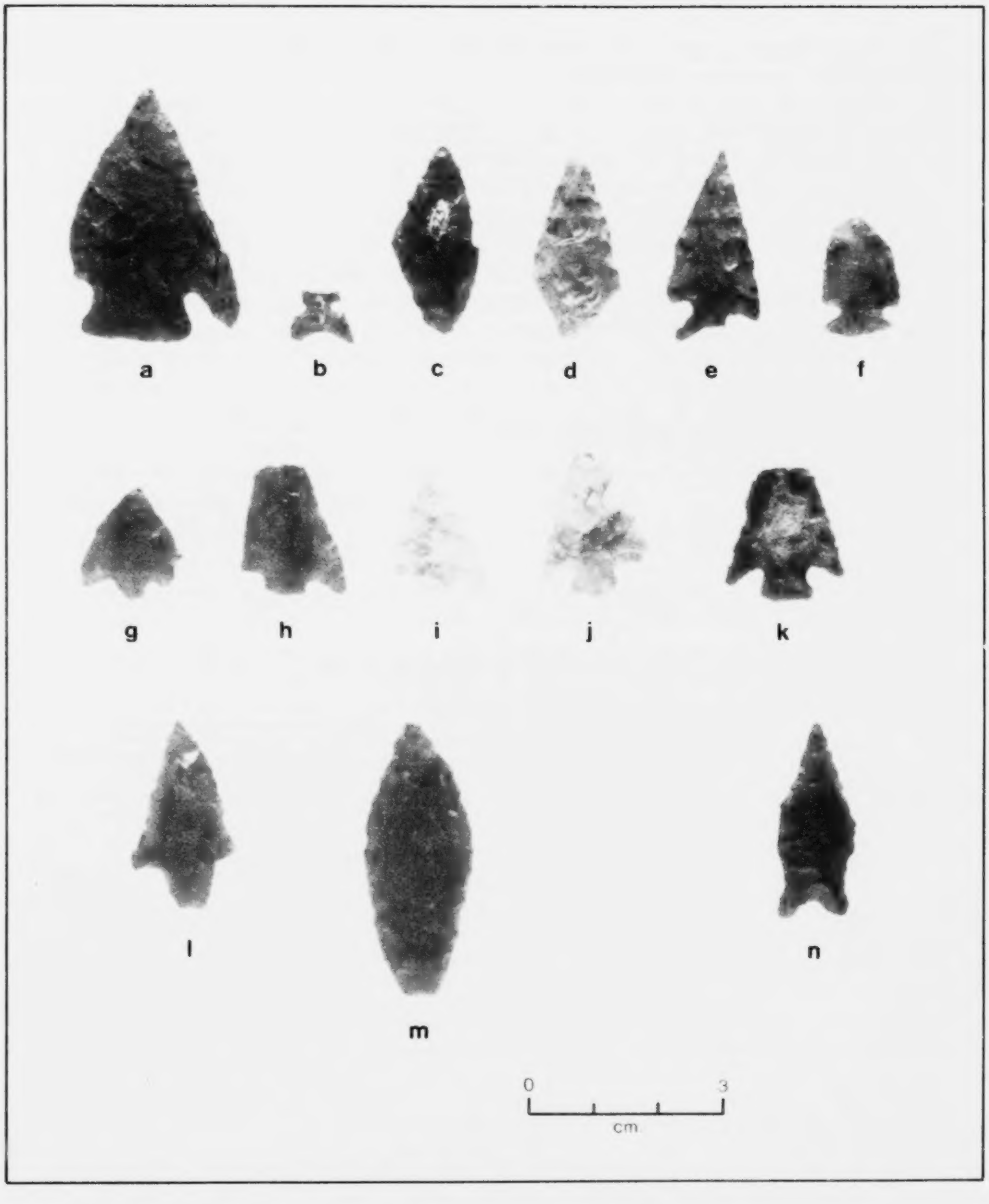

a
b
c
d
e
f
g
h
i
j
k
l
m
n
0
3
cm

Table 3-38. Distribution of morphological projectile point types by zone, 45-OK-2A.

Zone	Estimated Age (B.P.)		Morphological Type							Total
			5	6	8	12	14	16	18	
1	500	N	1	–	1	–	2	1	4	9
	2000	%	11.1		11.1		22.2	11.1	44.4	
2		N	1	–	–	1	–	–	–	2
	3000	%	50.0			50.0				
3	>4500	N	–	1	–	–	–	–	–	1
		%		100.0						
Total		N	2	1	1	1	2	1	4	12

Table 3-39. Distribution of historic projectile point types by zone, 45-OK-2A.

Zone	Estimated Age (B.P.)		Historic Type									Total
			21	23	15	52	53	63	71	73	75	
1	500	N	–	1	–	–	1	2	1	2	2	9
	2000	%		50.0			11.1	22.2	11.1	22.2	22.2	
2		N	1	–	–	1	–	–	–	–	–	2
	3000	%	50.0			50.0						
3	>4500	N	–	–	1	–	–	–	–	–	–	1
		%			100.0							
Total		N	1	1	1	1	1	2	1	2	2	12

Summary

In general, the relative proportions of types of both classifications conform to unimodal curves, confirming their utility as historical types, despite the fact that each individual type may have a relatively long time span. All of the historic types exhibit unimodal curves. The morphological point types with the largest sample sizes, Types 4, 13, 14, and 18, all exhibit unimodal curves, and Types 2, 6, 7, 8, 11, and 12 do as well. Types 15 and 16, with but a single occurrence each, are of little utility as historic types. Types 5, 9, 10, and 17 deviate from unimodal curves. Although these have relatively small sample sizes, we also suspect that the definitions are too broad and thus too inclusive to be useful historical types, especially in the case of Type 10.

Most of the point types at 45-OK-2, whether historic or morphological, occur in several zones, and their simple presence and absence is not sufficient to date a zone. However, both classifications measure quantitative differences between the zones, and confirm that the zones do provide temporally discriminated assemblages. In light of the long time span of most point types at 45-OK-2, the dating of zones at 45-OK-2A on the basis of a few points is somewhat questionable. It is, however, the best approximation that can be made at this time.

4. FAUNAL ANALYSIS

Zoological remains from archaeological sites provide a unique source of data on the ecology and historic biogeography of animal species living in the site area, and on utilization of faunal resources by human occupants of the site. This chapter describes the faunal assemblage from 45-OK-2 and 45-OK-2A, and summarizes the implications of the assemblage for understanding the archaeology of the site.

FAUNAL ASSEMBLAGE

The distribution of faunal remains by zone is summarized in Table 2-3 and 2-4. The vertebrate assemblages from 45-OK-2 consists of 237,915 elements weighing 54.1 kg, and the assemblage from 45-OK-2A consists of 13,597 bone elements weighing 3.5 kg. Of the 45-OK-2 vertebrate assemblage, 4,951 fragments (approximately 2%) were identified to at least the family level. Eighty-eight percent of the identified elements represented mammals, 3% reptiles, less than 1% amphibians, and 8% fish. Of the 45-OK-2A vertebrate assemblage, 836 fragments (approximately 6%) were identified. Sixty seven percent of the identified elements represent mammals, 5% reptiles, less than 1% amphibians, and 27% fish. All taxa identified from both sites are native to the site area and, with the exception of those animals recently extirpated, all may be found in the site area today. Taxonomic composition and distribution of the vertebrate assemblage are summarized in Table 4-1. The details of these assemblages are given in Appendix C. The identified assemblages are dominated by extremely fragmented artiodactyl elements, as would be expected if the bones were being crushed for marrow or grease extraction (Leechman 1951). Most of the unidentifiable bone fragments appear to be fragments of artiodactyl long bones resulting from the same treatment and from natural deterioration of fragmented bone.

There are 72,145 fragments of shell weighing 48.6 kg in the 45-OK-2 assemblage and 687 shell fragments weighing 30 g in the 45-OK-2A assemblage. Although the shell assemblage from these sites has not been identified, shell identified in the testing phase of the project showed that the majority of the shell in the project area is *Margaritifera falcata* with a minor component of *Gonidea angulata*.

Table 4-1. Taxonomic composition and distribution of vertebrate remains, 45-OK-2 and 45-OK-2A.

Taxa	Zone								Site Total	
	1		2		3		4			
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
45-OK-2										
MAMMALIA (NISP=4447)										
Leporidae										
Lepus cf. *townsendii*	–	–	–	–	2	1	4	1	6	1
Sciuridae										
Marmota flaviventris	13	2	12	1	–	–	2	1	27	1
Castoridae										
Castor canadensis	–	–	4	1	2	1	–	–	6	1
Geomyidae										
Thomomys talpoides	5	2	58	7	89	8	120	8	272	20
Heteromyidae										
Perognathus parvus	5	1	35	7	50	5	20	4	110	14
Cricetidae	–	–	2	–	14	–	2	–	18	–
Ondatra zibethicus	–	–	–	–	1	1	–	–	1	1
Neotoma cinerea	–	–	2	1	–	–	–	–	2	1
Lagurus curtatus	1	1	3	2	3	1	–	–	7	2
Microtus spp.	–	–	5	2	3	1	4	2	2	5
Peromyscus maniculatus	1	1	2	1	8	4	3	1	14	7
Canidae	3	1	1	–	5	1	1	–	10	–
Canis sp.	–	–	5	1	1	1	1	1	7	1
Ursidae										
Ursus americanus	–	–	–	–	1	1	–	–	1	1
Mustelidae										
Lutra canadensis	6	1	–	–	–	–	–	–	6	1
Felidae										
Lynx sp.	–	–	1	1	–	–	1	1	2	1
Antilocapridae										
Antilocapra americana	3	1	10	1	2	1	1	1	16	1
Bovidae	–	–	–	–	–	–	–	–	–	–
Ovis canadensis	2	1	18	2	–	–	31	1	51	2
Cervidae	–	–	1	–	1	–	–	–	2	–
Cervus elaphus	1	1	3	1	2	1	1	1	7	1
Odocoileus spp.	575	2	631	3	342	4	473	10	2,021	9
Equidae										
Equus caballus	8	1	–	–	–	–	–	–	8	–
Sheep-Antelope	35	–	84	–	19	–	22	–	160	–
Deer Size	338	–	572	–	385	–	348	–	1,643	–
Elk Size	4	–	3	–	11	–	3	–	21	–
REPTILIA (NISP=170)										
Chelydridae										
Chrysemys picta	10	1	40	1	18	1	9	1	77	1
Colubridae	3	1	79	2	6	1	5	1	93	–
AMPHIBIA (NISP=17)										
Ranidae/Bufonidae	–	–	4	1	9	2	3	1	16	3
PISCES (NISP=402)										
Salmonidae	50	–	77	–	94	–	105	–	326	–
Cyprinidae	11	–	7	–	1	–	6	–	25	–
Catostomidae	–	–	–	–	–	–	6	–	6	–
Identified	1,074		1,659		1,046		1,172		4,951	
Unidentified	66,725		86,889		43,435		34,586		232,917	
TOTAL	67,844		88,808		44,340		35,755		237,915	

Table 4-1. Cont'd.

Taxa	Zone								Site Total	
	1		2		3		4			
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
45-OK-2A										
MAMMALIA (NISP=562)										
Leporidae										
Lepus cf. *townsendii*	1	1	–	–	–	–	–	–	1	1
Sciuridae										
Marmota flaviventris	1	1	–	–	1	1	1	1	3	1
Geomyidae										
Thomomys talpoides	1	1	19	4	12	3	20	3	52	9
Heteromyidae										
Perognathus parvus	1	1	18	4	3	1	3	1	25	5
Cricetidae	–	–	2	–	1	–	–	–	3	–
Lagurus curtatus	–	–	2	2	–	–	–	–	2	2
Microtus pennsylvanicus	–	–	–	–	1	1	–	–	1	1
Peromyscus maniculatus	1	1	–	–	–	–	–	–	1	1
Erethizontidae										
Erethizon dorsatum	3	1	–	–	–	–	–	–	3	1
Antilocapridae										
Antilocapra americana	–	–	5	2	–	–	–	–	5	2
Bovidae										
Ovis canadensis	–	–	187	1	–	–	–	–	187	1
Cervidae										
Odocoileus spp.	20	1	63	3	4	1	–	–	87	3
Deer Size	35	–	137	–	17	–	2	–	181	–
Sheep/Antelope	1	–	–	–	–	–	–	–	1	–
REPTILIA (NISP=43)										
Chelydridae										
Chrysemys picta	–	–	11	1	4	1	–	–	15	1
Colubridae	–	–	1	1	20	1	6	1	27	1
Boidae	–	–	–	–	1	1	–	–	1	1
AMPHIBIA (NISP=2)										
Ranidae/Bufonidae	–	–	–	–	2	1	–	–	2	1
PISCES (NISP=229)										
Salmonidae	4	–	133	–	79	–	9	–	225	–
Catostomidae	1	–	2	–	1	–	–	–	4	–
Identified	69		580		146		41	–	836	
Unidentified	5587		6,120		765		230	–	12,702	
TOTAL	5,656		6,700		911		271	–	13,538	

[1] Number of identified specimens.
[2] Minimum number of individuals.

SPECIES LIST

MAMMALS (45-OK-2 NISP=4447, 45-OK-2A NISP=562)

Lepus cf. townsendii (White-tailed hare) 45-OK-2 -- 6 elements, 45-OK-2A --1 element.

Two species of Lepus presently inhabit the project area, L. townsendii (white-tailed hare) and L. californicus (black-tailed hare). A third species, L. americanus (snowshoe hare), inhabits regions adjacent to the project area. These elements could not be assigned to species on the basis of morphological features. L. californicus is thought to have immigrated from the Great Basin during the early part of the twentieth century (Couch 1927; Dalquest 1948). L. americanus is largely nocturnal and secretive, and inhabits wooded areas. Consequently, these specimens have been tentatively assigned to L. cf. townsendii.

Marmota flaviventris (Yellow bellied marmot) 45-OK-2 -- 27 elements, 45-OK-2A -- 3 elements.

Marmots are common residents of talus slopes in the site area. They were used ethnographically as a small game resouce (Ray 1932; Post 1938).

Castor canadensis (beaver) 45-OK-2 -- 6 elements.

There is ethnographic evidence that beaver were used (Post 1938), presumably for their pelts and as a food resource, though neither use is explicitly stated. Beaver teeth have been used for incising wood, bone, antler and soft stone by the Coeur d'Alene (Teit 1930).

Thomomys talpoides (Northern pocket gopher) 45-OK-2 -- 281 elements, 45-OK-2A -- 52 elements.

Pocket gophers are common in the project area. They spend most of their lives underground and burrow extensively.

Perognathus parvus (Great Basin pocket mouse) 45-OK-2 -- 111 elements, 45-OK-2A -- 25 elements.

Pocket mice are common residents in the sagebrush areas of eastern Washington. P. parvus burrows extensively. Pocket gophers and pocket mice are probably present in these assemblages as a result of natural depositional processes.

Ondatra zibethicus (Muskrat) 45-OK-2 -- 1 element.

Muskrats are active year round in the project area. Ethnographically they taken during the winter months (Ray 1932), undoubtedly because the waterproof pelt is at its prime in winter. There is no ethnographic record that the meat of this animal was eaten.

Neotoma cinerea (Bushy tailed woodrat) 45-OK-2 -- 2 elements.

Woodrats are common in the project area, but it is reported that they were not taken by ethnographically known people because of the unpleasant odor of the meat (Ray 1932).

Lagurus curtatus (Sagebrush vole) 45-OK-2 -- 7 elements, 45-OK-2A -- 2 elements.

Sagebrush voles inhabit dry sagebrush areas with little grass (Maser and Storm 1970:142). Only cranial material of this species is distinguishable from Microtus sp. The occlusal surface of M^3 (Maser and Storm 1970) and the location of the mandibular foramen (Grayson 1984) are distinctive.

Microtus sp. (meadow mouse) 45-OK-2 -- 9 elements, 45-OK-2A -- 1 element.

Three species of Microtus occur in the site area: M. montanus, M. pennsylvanicus and M. longicandus. All three species inhabit marshy areas or live near streams. M. montanus can also be found in more xeric areas. None of the elements in this assemblage could be assigned to species.

Peromysocus maniculatus (deer mouse) 45-OK-2 -- 9 elements, 45-OK-2A --1 element.

Deer mice are residents of all habitat types in the project area. Deer mice, sagebrush voles and meadow mice are probably present in these assemblages as the result of natural depositional processes.

Erethizon dorsatum (porcupine) 45-OK-2 -- 3 elements.

Canis sp. (Wolves, coyotes, and dogs) 45-OK-2 -- 6 elements.

Both Canis latrans (coyote) and C. familiaris (domestic dog) are common in the project area today. C. latrans is an indigenous species, and C. familiaris has great antiquity in the northwest (Lawrence 1968). C. lupus (wolf) is known to have been a local resident in the past, but has been locally extinct since about 1920 (Ingles 1965). It was not possible to determine the species of these elements. Dogs were used ethnographically for hunting deer, but were not eaten except in emergencies (Post 1938). Coyotes, however, were considered good food by some groups (Ray 1932:90).

Ursus americanus (Black bear) 45-OK-2 -- 1 element.

Black bears are native to the forested mountain regions adjacent to the site (Ingles 1965). There are ethnographic records indicating that black bears were hunted (Ray 1932; Post 1938).

Lutra canadensis (River otter) 45-OK-2 -- 7 elements.

River otters inhabit a variety of habitats near rivers, streams and lakes. Their pelts are today considered one of the most valuable in the country (Ingles 1965).

Lynx cf. rufus (Bobcat) 45-OK-2 -- 2 elements.
Bobcat (L.rufus) and Canadian lynx (L. canadensis) are extremely difficult to distinguish osteologically. Postcranially, the major difference between the species is size -- the bobcat is somewhat smaller. These two elements have tentatively been assigned to L. rufus on the basis of size. Bobcats are ubiquitous throughout Washington, while Canadian lynx are less common and inhabit the forested regions in the higher mountains (Ingles 1965). Bobcats were taken with traps and deadfalls by aboriginal groups (Ray 1938:85).

Antilocapra americana (Pronghorn antelope) 45-OK-2 -- 16 elements, 45-OK-2A -- 5 elements.

Although antelope are only present today in Washington as an introduced species (Ingles 1965), antelope remains are common in both historic and prehistoric archaeological sites, especially in the arid part of the Columbia Basin (Gustafson 1972; Osborne 1953). There are ethnographic records of hunting practices associated with antelope procurement (Ray 1932; Post 1938).

Ovis canadensis (Mountain sheep) 45-OK-2 -- 51 elements, 45-OK-2A -- 187 elements.

Mountain sheep occur in archaeological sites in eastern Washington with some regularity. The presence of this species is somewhat difficult to interpret, however, because references to it in the ethnographic literature are so scarce. Moreover, when competition with man and domestic stock for range became severe during historic times, the habitat preference of this species appears to have changed. (Manville 1980). Mountain sheep are known ethnographically to have been exploited both for meat and as a source of bone for tools (Spinden 1908).

Cervus elaphus (Elk) 45-OK-2 -- 11 elements.

Elk are not a member of the extant local fauna of the project area. The closest living population is in the Cascade Mountains to the west (Ingles 1965). Elk bones occur in low frequencies in many archaeological sites in eastern Washington, however, indicating that elk once occupied a more extensive range than at present and/or that people were traveling some distance to hunt them.

Odocoileus virginianus (white-tailed deer) 45-OK-2 -- 32 elements.

Odocoileus hemionus (mule deer) 45-OK-2 -- 12 elements.

Odocoileus sp. 45-OK-2 -- 2029 elements, 45-OK-2A -- 87 elements.

The only deer elements in this assemblage identified to species are mandibles with teeth; these were assigned on the basis of discriminant analysis. Deer are believed to have represented a major food source for the prehistoric inhabitants of eastern Washington (Gustafson 1972) as they did for the ethnographically known cultures (Post 1938; Ray 1932).

Equus caballus (horse) 45-OK-2 -- 8 elements.

Horse is a late introduction into the project area, probably first known in the area by approximately 1850 (Ray 1932).

REPTILES (45-OK-2 - NISP=170, 45-OK-2A - NISP=43)

Chrysemys picta (Painted turtle) 45-OK-2 -- 77 elements, 45-OK-2A -- 15 elements.

Painted turtle is the only turtle currently living in the project area. Clemmys marmorata (western pond turtle) has been reported in the eastern part of Washington in the ethnographic literature (Ray 1932:87), but this would represent a major extension of the known range of C. marmorata. At the present time, C. marmorata only occur on the west side of the Cascades and in the southern part of the state. Because there is no way of verifying that any other turtle has ever lived in the project area, and no indication that they were imported, all turtle remains have been assigned to C. picta.

Colubridae (Colubrid snakes) 45-OK-2 -- 93 elements, 45-OK-2A -- 28 elements.

Snake vertebrae were identified to family on the basis of size. There are at least four species of snakes living in the project area that may be represented by these vertebrae: Coluber constrictor (western yellow-bellied racer), Pituopis melanoleucus (Gopher snake), Thamnophis sirtalis (valley garter snake), and T. elegans (wandering garter snake).

AMPHIBIANS (45-OK-2 - NISP=17, 45-OK-2A - NISP=2)

Ranidae/Bufonidae (frogs and toads) 45-OK-2 -- 17 elements, 45-OK-2A -- 2 elements.

Both frogs and toads inhabit the project area (Stebbins 1966). Inadequate comparative material precluded assigning these elements to the correct Family.

FISH (45-OK-2 - NISP=402, 45-OK-2A - NISP=229)

Salmonidae (Salmon, trout, and whitefish) 45-OK-2- 371 elements, 45-OK-2A -- 225 elements.

These vertebrae could belong to any of at least eight species of salmonid fish known in the project area. All fish vertebrae with parallel-sided fenestrated centra were assigned to this family.

Cyprinidae (Minnows) 45-OK-2 -- 25 elements.

Catostomidae (Suckers) 45-OK-2 -- 6 elements, 45-OK-2A -- 4 elements.

Inadequate comparative material precluded more specific identification of fish vertebrae. Assignment of non-salmonid fish vertebrae to family was made on the basis of size. There are ethnographic records of ethnographic groups utilizing fish of all 3 families (Post 1938; Ray 1932).

SUBSISTENCE

Artiodactyls are the primary subsistence resource represented in these assemblages. Artiodactyl elements comprise over 78% of the total identified elements in the 45-OK-2 assemblage and 56% of the total identified elements in the 45-OK-2A assemblage. Although most small artiodactyl elements could not be identified to genus and species, those elements that could be identified suggest that deer (Odocoileus spp.) are the most frequently represented artiodactyl in both assemblages. Mountain sheep, pronghorn antelope and elk were also identified in lesser frequencies. Due to the extremely fragmented nature of these assemblages, many of the artiodactyl elements that could be identified to genus are cranial elements and distal appendages. However, when those elements identified only to size categories are also considered, there is no reason to suggest differential use of certain parts of the carcass. All parts of the skeleton are represented. The high MNI to NISP ratio for deer in Zone 4 at 45-OK-2 reflects the recovery of a large number of deer mandibles in that zone. Several different explanations may account for the larger number of mandibles in Zone 4: hunting techniques made it more likely that the cranium was brought back with the carcass; processing techniques made it more likely that the cranial material was disposed of in a manner that favored preservation; preservation and/or recovery for that Zone favored these elements. It is most likely that one or both of the first two possibilities are responsible for the differences in skeletal element representation.

The distributions of butchering marks and burned elements in these assemblages are shown in Table 4-2 and Table 4-3 respectively. In the 45-OK-2 assemblage, a total of 374 elements exhibit butchering marks, and 283 elements are burned. In the 45-OK-2A assemblage, a total of 20 elements exhibit butchering marks and 32 elements are burned. Fourteen of the 45-OK-2 elements were classified as artifacts and are discussed elsewhere (see Chapter 3). The remaining 380 elements displaying butchering marks are from artiodactyls.

Burned bones occur across a wide variety of taxa, but most frequently among the artiodactyls. As was suggested by relative abundances, the distribution of butchering marks and burned elements indicate that artiodactyls, especially deer, are the primary mammalian food resource represented in this assemblage. Distribution of butchering marks and burning on the various elements suggest no pattern of differential use of skeletal parts. Table 4-2 shows that butchering marks occur on almost all elements and Table 4-3 shows that most elements are at least occasionally burned. This data is suggestive of thorough utilization of the carcass.

The inclusion of small mammals such as cricetid mice and pocket gophers in an archaeological assemblage frequently is considered an accident of post depositional intrusion. However, evidence of butchering or burning weakens the case for accidental inclusion. Stahl (1982) has recently demonstrated that small mammals offer a high meat yield per live weight and that they are relatively abundant in environments associated with human activity. He argued that many small mammals may well have been a rich food resource in prehistoric subsistence systems. None of the small mammal bones in these assemblages, however, exhibited evidence of butchering and only a very small number were burned (Table 4-4). Therefore, it is not reasonable to conclude that all of the small mammals in this assemblage were utilized as a food resource. It remains a strong likelihood that the elements were burned in the process of refuse disposal. Whether the source of refuse is food remains or something else is indeterminable.

It is reasonable to suggest, however, that when all of the identified elements of a taxon are burned, that taxon may have represented an economic resource that was at least occasionally exploited. In the 45-OK-2 assemblage, _Lepus_ cf. _townsendii_ is such a taxon. Leporid elements are rare in the project area and this may be explained by one or more of the following reasons: rabbits were not an abundant resource in the past; they were not considered a desirable resource; and/or they do not preserve well. That all leporid elements in the 45-OK-2 assemblage are burned does not resolve the issue of why they do not occur in greater numbers, but it does suggest that rabbits were at least occasionally exploited.

Table 4-2. Distribution of butchering marks, 45-OK-2 and 45-OK-2A.

Element	Zone																							
	1						2					3						4						
	Deer			Deer-Sized			Deer		Deer-Sized			Deer	Deer-Sized				Elk	Deer			Deer-Sized			
	1	2	5	1	2	3	1	2	1	2	5	2	1	2	3	5	2	1	2	3	1	2	5	6
45-OK-2																								
Skull	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mandible	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	2	-	-	-	-	-
Atlas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Axis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cervical	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thoracic	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Lumbar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Centrum	-	-	-	2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rib	-	-	-	-	-	-	-	-	1	1	-	-	1	1	-	-	-	-	-	-	1	-	-	-
Sternum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Costal cartilage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scapula	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-
Humerus prox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Humerus shaft	-	-	-	-	3	-	-	-	-	9	-	-	-	5	-	-	-	-	-	-	-	5	-	-
Humerus dist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Radius prox	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Radius shaft	-	-	-	-	2	-	-	-	-	7	-	-	-	2	-	-	-	-	-	-	-	4	-	-
Radius dist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ulna prox	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ulna shaft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ulna dist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carpals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metacarpal prox	-	1	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metacarpal shaft	-	-	-	-	-	-	-	-	-	4	-	-	-	7	-	-	-	-	-	-	-	4	-	-
Metacarpal dist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Innominate	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Femur prox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Femur shaft	-	-	-	-	2	-	-	-	-	3	-	-	-	4	-	-	-	-	-	-	-	6	-	1
Femur dist	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Tibia prox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tibia shaft	-	-	-	-	2	-	-	-	-	7	-	-	-	-	-	-	1	-	-	-	-	5	-	-
Tibia dist	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Astragalus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcaneus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tarsals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metatarsal prox	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metatarsal shaft	-	-	-	-	1	-	-	-	-	13	1	-	-	8	-	-	-	-	-	-	-	6	2	-
Metatarsal dist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dewlcaw	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
First phalanx	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Second phalanx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Third phalanx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antler	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Metapodial prox	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
Metapodial shaft	-	-	-	-	-	-	-	-	-	6	-	-	-	8	1	-	1	-	-	-	-	8	2	-
45-OK-2A																								
Humerus shaft	-	-	-	-	1	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Radius shaft	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metacarpal shaft	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Femur shaft	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tibia shaft	-	-	-	-	1	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metatarsal shaft	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metapodial shaft	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1 = striae
2 = flake scar
3 = chopping scar
4 = saw cut
5 = artifact
6 = both striae and flake scar

Table 4-3. Distribution of burned bone elements, 45-OK-2 and 45-OK-2A.

Taxa	45-OK-2																												45-OK-2A							
	ZONE 1							ZONE 2								ZONE 3									ZONE 4				ZONE 1		ZONE 2				ZONE 3	
	Marmota flaviventris	Canis sp.	Odocoileus sp.	Deer Size	Elk Size	Chrysemys picta	Salmonid	Canis sp.	Antilocapra americana	Ovis canadensis	Odocoileus sp.	Deer Size	Elk Size	Sheep/Antelope	Salmonid	Cricetid	Thomomys talpoides	Lepus sp.	Canis sp.	Cervus elaphus	Odocoileus sp.	Deer Size	Elk Size	Salmonid	Lepus sp.	Ovis canadensis	Odocoileus sp.	Deer Size	Odocoileus sp.	Deer Size	Odocoileus sp.	Deer Size	Chrysemys picta	Salmonid	Deer Size	Salmonid
Antler	-	-	1	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Skull	-	-	-	-	-	-	-	-	-	1	2	3	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Otolith	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Mandible	1	-	2	-	-	-	-	-	-	-	2	7	-	-	-	1	1	-	-	-	-	1	-	-	-	1	-	1	-	-	1	-	-	-	-	-
Atlas	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Axis	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cervical	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Thoracic	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-
Lumbar	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Vertebra	-	-	-	1	-	-	4	-	-	-	-	9	-	-	12	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Veritrae centrum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	-	-
Rib	-	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	1	-	-	-	-
Sternum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Costal cartilage	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scapula	-	-	-	-	-	-	-	1	-	-	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Humerus prox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Humerus shaft	-	-	-	-	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Humerus dist	-	-	-	1	-	-	-	-	1	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Radius prox	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Radius shaft	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Radius dist	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ulna prox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ulna shaft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
Ulna dist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carpals	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metacarpal prox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metacarpal shaft	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-
Metacarpal dist	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Innominate	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Femur prox	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Femur shaft	-	-	-	-	-	-	-	-	-	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Femur dist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tibia prox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tibia shaft	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Tibia dist	-	-	-	1	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Astragalus	-	-	-	1	-	-	-	-	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcaneus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Tarsals	-	-	-	2	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Metatarsal prox	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metatarsal shaft	-	-	-	3	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-	2	-	2	-	-	-	-
Metatarsal dist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dewclaw	-	-	-	3	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
First phalanx	-	-	-	3	-	-	-	-	1	-	1	12	-	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-
Second phalanx	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Third phalanx	-	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	1	-	-	-	-	-
Phalanx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-
Metapodial prox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Metapodial shaft	-	-	-	-	2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	3	-	-	2	-	-	1	-	2	-	-	-	-	-	-
Metapodial dist	-	-	-	1	2	-	-	-	2	1	-	11	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Sesamoid	-	-	-	-	2	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tooth	1	-	2	-	-	-	-	-	-	1	3	-	6	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shell	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-

Table 4-4. Distribution of butchering marks[1] and burned bone[2] by taxon, 45-OK-2 and 45-OK-2A.

Taxa	Site Total						Zone 1					Zone 2				Zone 3					Zone 4					
	1	2	3	5	6	B	1	2	3	5	B	1	2	5	B	1	2	3	5	B	1	2	3	5	6	B
45-OK-2																										
Lepus cf. *townsendii*	–	–	–	–	–	6	–	–	–	–	–	–	–	–	–	–	–	–	–	*2	–	–	–	–	–	*4
Marmota flaviventris	–	–	–	–	–	4	–	–	–	–	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cricetid	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Thomomys talpoides	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Canis sp.	–	–	–	–	–	3	–	–	–	–	–	–	–	–	2	–	–	–	–	1	–	–	–	–	–	–
Antilocapra americana	–	–	–	–	–	5	–	–	–	–	–	–	–	–	*5	–	–	–	–	–	–	–	–	–	–	–
Ovis canadensis	–	–	–	–	–	9	–	–	–	–	–	–	–	–	8	–	–	–	–	–	–	–	–	–	–	–
Cervus elaphus	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–
Odocoileus sp.	4	10	1	–	–	31	1	4	–	1	7	2	1	–	19	–	2	–	–	4	1	3	1	–	–	1
Deer Size	15	144	2	6	2	192	5	15	1	–	30	5	54	1	140	2	41	1	1	13	3	34	–	5	2	9
Elk Size	–	2	–	–	–	4	–	–	–	–	1	–	–	–	1	–	2	–	–	2	–	–	–	–	–	–
Sheep/Antelope	–	–	–	–	–	6	–	–	–	–	–	–	–	–	6	–	–	–	–	–	–	–	–	–	–	–
Chrysemys picta	–	–	–	–	–	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Salmonid	–	–	–	–	–	18	–	–	–	–	4	–	–	–	12	–	–	–	–	2	–	–	–	–	–	–
Total	19	154	3	6	2	283	6	19	1	1	42	7	55	1	193	2	45	1	1	28	4	37	1	5	2	15
45-OK-2A																										
Odocoileus sp.	–	–	–	–	–	5	–	–	–	–	3	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–
Deer-Sized	–	20	–	–	–	21	–	5	–	–	9	–	15	–	8	–	–	–	–	4	–	–	–	–	–	–
Chrysemys picta	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–
Salmonid	–	–	–	–	–	5	–	–	–	–	–	–	–	–	4	–	–	–	–	1	–	–	–	–	–	–
Total	–	20	–	–	–	32	–	5	–	–	12	–	15	–	15	–	–	–	–	5	–	–	–	–	–	–

[1] Key to butchering marks
1 = striae
2 = flake scar
3 = chopping scar
4 = saw cut
5 = artifact
6 = both striae and flake scar

[2] B = burned

* = All elements identified to this species for this zone are burned.

Salmonid fish probably represent a major, non-mammalian food resource at these sites. Of the three families recognized in this assemblage--salmonid, cyprinid (minnow), and catostomid (suckers)-- salmonid remains occur in greatest frequency (371 salmonid, 25 cyprinid, 6 catostomid in 45-OK-2 and 225 salmonid and 4 catostomid in 45-OK-2A). While some of the difference in frequency of occurrence may be due to the fragmentary nature of the salmonid remains (a single element may be counted more than once because it is broken), it still holds that there are more salmonid remains in these assemblages. The difference in fragmentation among the three families may be a taphonomic factor--the salmonid vertebrae are more delicately constructed and may break more easily (see Casteel 1976:88-92 for a discussion of fragmentation of salmonid vertebrae). However, burned elements occur only in the salmonid fish (18 elements in the 45-OK-2 assemblage, 5 elements in the 45-OK-2A assemblage); none of the cyprinid or catostomid remains appeared burned. Together the differences in fragmentation and burning suggest there may have been a difference in the way fish of the various families were utilized.

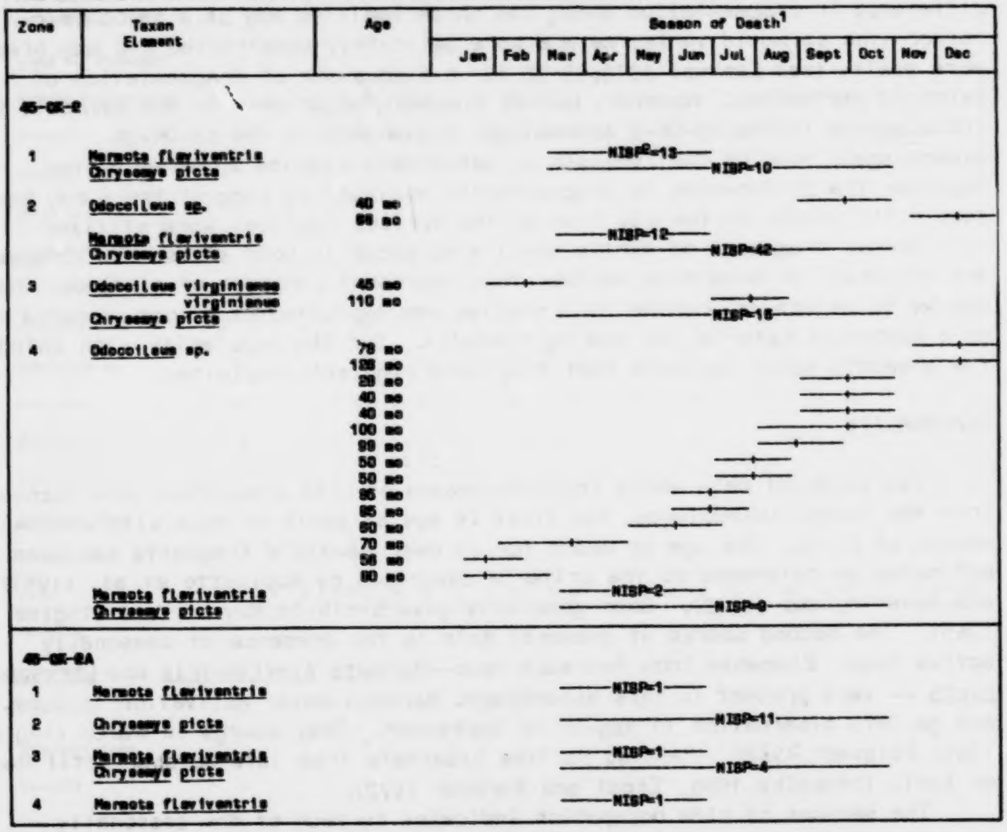
Burned fragments of turtle shell also occur in both sites. The fragments are too small to determine whether they represent carapace or plastron. Nor can we to determine whether this species was exploited as a food resource or as a source of material for making utensils. But the regularity with which the elements occur indicate that they were regularly exploited.

SEASONALITY

Two kinds of data which indicate season of site occupation were recovered from the faunal assemblages. The first is age at death of taxa with a known season of birth. The age at death for 19 deer mandible fragments has been estimated by reference to the criteria described by Robinette et al. (1957) and Severinghaus (1949). Deer generally give birth in May or June (Ingles 1965). The second source of seasonal data is the presence of seasonally active taxa. Elements from two such taxa--Marmota flaviventris and Chrysemys picta -- were present in this assemblage. Marmots enter estivation in June, and go into hibernation in August or September. They emerge in March (Ingles 1965; Dalquest 1948). Painted turtles hibernate from late October until March or April (Stebbins 1966, Ernst and Barbour 1972).

The seasons of site occupation indicated by each of the seasonally sensitive taxa at these sites (Odocoileus sp, Marmota flaviventris, Chrysemys picta) are summarized in Table 4-5. The range of months indicated by deer teeth has been extended because the individual wear pattern from which age is assessed is highly variable. Not only does wear pattern by which wear is determined depend on the location of the population and the forage type, but the wear variation increases with the age of the animal. Examination of Table 4-5 reveals no evidence indicating a seasonal use of this site in any given Zone. The sample sizes for Zones 1, 2, and 3 are small and includes the less sensitive seasonal indicators (marmots and especially turtles are available for a relatively long span of time during the year). The Zone 4 sample includes 15 ageable deer mandibles. The age at death determined for these

Table 4-5. Distribution of seasonal indicators, 45-OK-2 and 45-OK-2A.



Zone	Taxon Element	Age	Season of Death[1]
45-OK-2			
1	Marmota flaviventris		NISP[2]=13
	Chrysemys picta		NISP=10
2	Odocoileus sp.	40 mo 88 mo	
	Marmota flaviventris		NISP=12
	Chrysemys picta		NISP=42
3	Odocoileus virginianus virginianus	45 mo 110 mo	
	Chrysemys picta		NISP=18
4	Odocoileus sp.	78 mo 128 mo 20 mo 40 mo 40 mo 100 mo 99 mo 50 mo 50 mo 85 mo 85 mo 60 mo 70 mo 56 mo 80 mo	
	Marmota flaviventris		NISP=2
	Chrysemys picta		NISP=9
45-OK-2A			
1	Marmota flaviventris		NISP=1
2	Chrysemys picta		NISP=11
3	Marmota flaviventris		NISP=1
	Chrysemys picta		NISP=4
4	Marmota flaviventris		NISP=1

[1] Because reliability of estimates for artiodactyls decreases with increasing age, we use a two month span for season of death for individuals ≤24 months, a four month span for individuals >24 months and <100 months, and a five month span for individuals ≥100 months.

[2] Number of Identified Specimens.

mandibles indicates that over half of them were taken in the late summer or fall. However, the remaining individuals appear to have been taken throughout the rest of the year. This evidence indicates that the Zone 4 occupation at 45-OK-2 spanned all four seasons.

Season of occupation at 45-OK-2A is indicated only by the presence of a single marmot element in each of Zones 1, 3 and 4; and turtle elements in Zones 2 and 3. As in the case of Zone 1 of 45-OK-2, these elements may broadly indicate that 45-OK-2A was occupied at least during some of the warm months.

SUMMARY

The composition of the vertebrate fauna from 45-OK-2 and 2A is representative of the fauna expected in the project area. Taxa found in the archaeological faunas that are no longer found in the area of the sites are antelope, bison and mountain sheep. Antelope and bison became locally extinct in late prehistoric or historic times and the nearest occurrence of mountain sheep is Mount Chopaka in the extreme northeastern Cascades (Dalquest 1948). With the exception of mouse, gopher, snake and frog/food elements it appears that these faunal assemblages represent an accumulation of refuse from economic activities of the human site inhabitants.

In both sites the mammalian fauna comprises predominantly small artiodactyl elements. Of the small artiodactyl elements that could be identified at least to the genus level, the most abundant taxon is deer (Odocoileus spp.). In 45-OK-2 there is also a small number of elk and elk sized elements. Most of the artiodactyl assemblage is extremely fragmented, indicating intensive use and/or poor preservation. Butchering marks and evidence of burning on the artiodactyl elements, along with the extreme fragmentation indicate thorough utilization of artiodactyl carcasses. Fish, especially the salmonids, occur with some regularity in both sites, and probably also represent an economic resource. The small rodents, gophers and mice show no evidence of cultural use. The array of large rodents and carnivores identified in the 45-OK-2 assemblage may represent animals exploited for food and furs.

5. BOTANICAL ANALYSIS

Botanical studies, sometimes termed paleoethnobotany, concern analysis of vegetable materials found in archaeological matrices (Dimbleby 1967; Renfrew 1973; Dennel 1967; Ford 1979). These materials provide valuable information concerning the resource base of peoples who inhabited a site. With lithic and faunal materials, they give us the means for making inferences about the peoples' patterns of subsistence, as well as for interpreting site features. The presence and condition of specific kinds of fruits seeds and flower parts, for instance, can suggest seasonality of site use.

The botanical assemblages from selected features, structures, and nonfeature levels at 45-OK-2 and 45-OK-2A are but a small portion of the botanical remains from the two sites, but they provide a fascinating glimpse of the varied ways in which plant materials were used in the lives of the prehistoric inhabitants. Botanical analysis allows us to reconstruct the superstructure of Structure N at 45-OK-2, which was constructed with at least seven different types of wood, most of which would have been obtainable only as driftwood. The modification of some wood into planks is revealed in microscopic examination. The manufacture of smaller artifacts is also documented in this analysis: a larch point, a resin-coated object, and twisted cordage were found on structure floors, and fibrous plant materials suitable for cordage and textiles were found in occupation debris. The botanical contents of four features at 45-OK-2A, described in the final section of the chapter, support interpretations of feature function at odds with those arrived at on the basis of the structural evidence and other contents. Feature 5, considered to be an oven, was found to have a pine branch lining and to contain what may be the remains of prepared dried fruits and roots. One pit feature contained fuel woods and an unidentified inorganic residue, while another contained woods which may be debris from manufacturing small items as well as woods used for fuel.

BOTANICAL REMAINS FROM 45-OK-2

Over 500 flotation samples were collected under the direction of the archaeobotanist during the summer excavation season at 45-OK-2. However, only a small proportion of the flotation samples and charcoal samples could be examined in the time available for analysis. We decided, therefore, to analyze samples from a limited area, rather than to select samples from scattered locations. The Housepit 3 area was chosen for examination because excavations here had revealed two structures in Zone 2 and an historic occupation in Zone 1. A total of 33 flotation samples, taken from over 92 kg of sediment, were examined. Twenty-two carbon samples collected for radiocarbon dating and three samples of miscellaneous charcoal extracted from unit level bags, weighing 1,037 g were also examined.

The flotation samples examined were from three units--18S370W, UL 10 to 110, 24S371W, UL 10 to 120, and 28S368W, UL 10 to 50. Flotation samples were collected from every level, generally from the northwest corner of the northwest quadrant except when taken from a feature in the level instead. They were large samples, averaging 3.1 kg. All were subjected to water separation and sugar flotation. Standard subsamples were drawn from the water light fraction, but all fractions in the samples were scanned to be certain nothing was missed. Sampling and flotation procedures are described in detail in the project's research design (Campbell 1984d).

The 5.13 g of archaeobotanical materials from flotation samples were distributed among the four analytic zones and four features. Figure 5-1 shows the carbon ratios and purity ratios from flotation samples by depth, analytic zone, and age in radiocarbon years. Table 5-1 and 5-2 summarize the botanical assemblage from both flotation samples and carbon samples. The assemblage is presented below in detail and arranged alphabetically by family, with references to possible uses indicated in the ethnobotanical and ethnographic literature. Seasonality data are included where pertinent. The assemblages from each zone are summarized in a following section.

ASTERACEAE (Composite, Daisy Family)

Artemisia tridentata Nutt. (sagebrush, big sagebrush)

Sage charcoal is not common in these samples. It was found in only three of 33 flotation samples. These are from Analytic Zones 1, 2, and 3.

Helianthus annuus L. (sunflower, common sunflower)

A partial sunflower achene (Plate 5-1) was found in occupation debris in Housepit 3 (Flotation Sample 217). The surviving section is 1.7 mm wide by at least 3 mm long. Charring has exposed the longitudinal fiber bundles. The total length of the seed was probably of another millimeter or more in charred state. The uncharred length is probably from 4.7 to 6.0 mm, or about the same as another archaeological _Helianthus_ seed from 45-OK-288 Housepit A (Miss 1984d:Chapter 8:13-14).

This size falls within the range of _H. annuus lenticularis_, the roadside ruderal (feral domestic) sunflower that colors our roadsides in late August through September. It is larger than present day wild sunflower seeds and smaller than of most of the earliest domesticated sunflower achenes found in archaeological sites which date to the first millenium B.C. in the Midwest and American Southwest (Yarnell 1978:291, 292-3, Table 1).

Table 5-1. The botanical assemblage from 33 flotation samples, 45-OK-2 (indicates total weight [gm] and number of samples in which taxon occurs [N]).

Identified Botanical Materials	Unassigned (4 samples)		Zone 1		Zone 2										Zone 3		Total (33 samples)	
			Unit Levels (7 samples)		Feature 42 (1 sample)		Unit Levels (12 samples)		Feature 49 (2 samples)		Feature 69 (1 sample)		Feature 100 (1 sample)		(5 samples)			
	grams	N	grams	N	grams	N	grams	N	grams	N	grams	N	grams	N	grams	N	grams	N
Conifer (71%)																		
Lodgepole pine	0.33	2	-	-	-	-	0.38	2	-	-	-	-	-	-	-	-	0.71	4
Ponderosa pine	0.17	2	-0.01	1	-	-	-	-	-	-	-	-	0.02	1	0.01	2	0.20	6
White pine	-	-	-	-	-	-	0.01	1	-	-	-	-	-	-	-	-	0.01	1
Yellow pine	-	-	0.01	2	-	-	0.05	3	-	-	0.01	1	0.02	1	-	-	0.09	6
Douglas fir	0.04	2	0.01	3	-	-	0.07	4	0.01	1	-	-	0.01	1	-0.01	1	0.14	12
Larch	-	-	-0.01	1	-	-	-	-	0.04	2*	-	-	-	-	-	-	0.04	3
Hemlock	-0.01	1	-	-	-	-	0.03	2	-	-	-	-	-	-	-	-	0.03	3
Pinaceae	0.01	1	-	-	-	-	0.01	3	-	-	-	-	-	-	-	-	0.02	4
Red cedar	-0.01	2	-0.01	1	-	-	0.01	3	0.86	2	-	-	-	-	0.02	2	0.89	10
Yellow cedar	0.01	1	-	-	1.00	1	-	-	-	-	-	-	-	-	-	-	1.01	2
Juniper	0.01	1	-	-	-	-	0.04	3	-	-	-	-	-	-	-	-	0.05	4
Cupressaceae	0.04	1	-	-	-	-	-0.01	1	-	-	-0.01	1	-	-	-	-	0.04	3
Yew	0.01	2	0.01	1	-	-	0.06	3	0.02	1	-	-	-	-	-	-	0.10	7
Bark	-0.01	2	-	-	-	-	-0.01	2	-	-	-	-	-0.01	1	-	-	-0.01	5
Other wood	0.15	3	0.02	2	-	-	0.14	11	-0.01	2	0.01	1	-0.01	1	-0.01	3	0.32	23
Hardwood (26%)																		
Sage	-	-	0.01	1	-	-	-	-	-0.01	1	-	-	-	-	-0.01	1	0.01	3
Mockorange	-	-	-0.01	1	-	-	0.01	1	-	-	-	-	-	-	-	-	0.01	2
Serviceberry	-	-	-	-	-	-	0.13	3	-	-	-	-	-	-	-	-	0.13	3
Hawthorn	-	-	-0.01	1	-	-	0.04	2	-	-	-	-	-	-	-	-	0.04	3
Bitterbrush	0.04	2	0.27	4	-	-	0.04	3	-	-	-	-	-	-	0.01	1	0.36	10
Serviceberry/ hawthorn	-	-	-	-	-	-	0.01	3	-	-	-0.01	1	-	-	-	-	0.01	2
Rosaceae	-0.01	1	-	-	-	-	0.01	3	-	-	-	-	-	-	-0.01	1	0.01	5
Clematis	-	-	-	-	-	-	0.01	1	-	-	-	-	-	-	-	-	0.01	1
Poplar	-	-	0.01	1	-	-	-	-	-	-	-	-	-	-	-	-	0.01	1
Willow	0.02	1	-	-	-	-	0.66	2	-	-	-	-	-	-	-	-	0.68	3
Poplar/willow	0.01	1	-0.01	1	-	-	-	-	-	-	-	-	-	-	-	-	0.01	2
Hackberry	-	-	-	-	-	-	0.01	2	-	-	-	-	-	-	-	-	0.01	2
Other wood	-0.01	2	0.03	1	-	-	-0.01	1	-0.01	1	-	-	-	-	-	-	0.03	5
Edible Material (>1%)																		
Seeds (3)	-	-	-	-	-	-	0.01	3	-	-	-	-	-	-	-	-	0.01	3
Root	-	-	-	-	-	-	0.01	1	-	-	-	-	-	-	-	-	-0.01	1
Other Tissue (3%)																		
Seeds (9)	-	-	-	-	-	-	0.02	2	-	-	-	-	-	-	-	-	0.02	2
Grass	-	-	-	-	-	-	-0.01	1	0.04	2	-	-	-	-	-	-	0.04	3
Leaf	-	-	-	-	-	-	-0.01	2	-	-	-	-	-	-	-	-	-0.01	2
Fiber ?	-	-	-	-	-	-	-0.01	1*	-	-	-	-	-	-	-	-	-0.01	1
Herbaceous stem	0.02	1	-0.01	2	-	-	0.04	6	-	-	-	-	-	-	-0.01	1	0.06	10
Nonwoody other	-	-	0.01	1	-	-	0.02	4	-	-	-	-	-	-	-	-	0.03	5
TOTAL	0.86	28	0.38	24	1.00	1	1.81	79	0.97	12	0.02	4	0.05	5	0.04	12	5.13	162

* Artifact

Table 5-2. The botanical assemblage from 25 carbon samples, 45-OK-2 (shows total weight [grams] and number of samples in which taxon occurs [N]).

Identified Botanical Materials	Zone 2						Zone 3		Total (25 samples)	
	Feature 42 (3 samples)		Feature 49 (18 samples)		Feature 97 (3 samples)		Unit Level (1 sample)			
	grams	N	grams	N	grams	N	grams	N	grams	N
Conifer										
Lodgepole pine	–	–	–	–	3.00^{2}	1	–	–	3.00	1
Douglas fir	–	–	12.03	2	–	–	–	–	12.03	2
Subalpine fir	103.00^{2}	1	86.00^{1}	2	–	–	–	–	189.00	3
Hemlock	–	–	61.00^{2}	3	–	–	–	–	61.00	3
Spruce	–	–	36.24	2	–	–	–	–	36.24	2
Red cedar	0.03	1	552.00^{1,2}	5	0.03	1	–	–	552.06	7
Yellow cedar	56.10^{2}	2	50.00^{2}	5	–	–	–	–	106.10	7
Juniper	46.90^{2}	2	0.06	1	2.80^{2}	1	–	–	49.76	4
Cedar bark	–	–	3.40^{2}	1	–	–	–	–	3.40	1
Hardwood										
Bitterbrush	–	–	0.05	1	–	–	–	–	0.05	1
Willow	–	–	24.30^{2}	2	0.05	1	–	–	24.35	3
Edible Material										
Chokecherry seeds (6)	–	–	0.05	2	–	–	0.01	1	0.06	3
Other Tissue										
Seed (1)	–	–	0.01	1	–	–	–	–	0.01	1
TOTAL	206.03	6	825.14	27	5.88	4	0.01	1	1,037.06	38

[1] Artifact

[2] Includes completely carbonized wood.

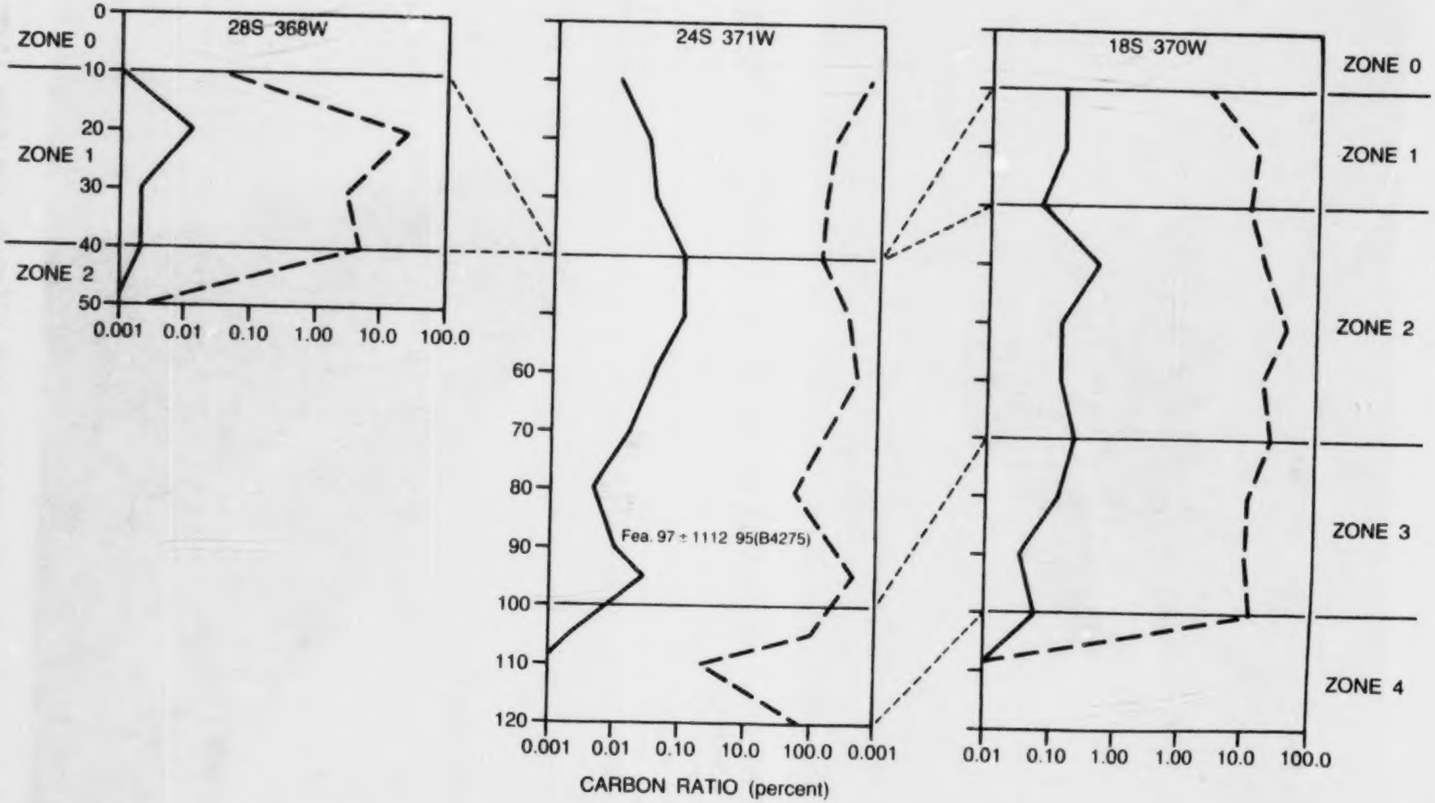


Figure 5-1. Carbon to soil ratio and carbon purity by analytic zone, radiocarbon year and unit level in Housepit 3.

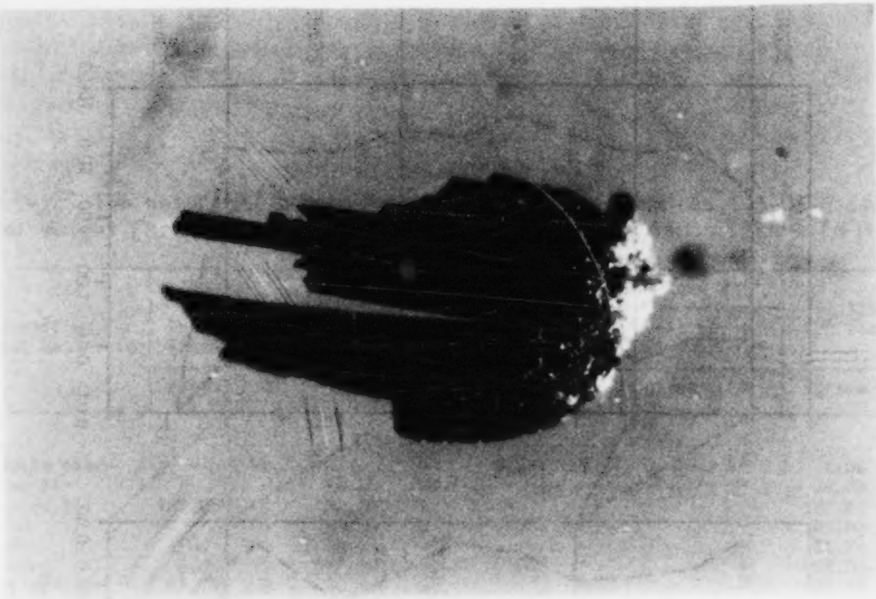


Plate 5-1. Helianthus annuus achene fragment from Housepit 3, 45-OK-2.

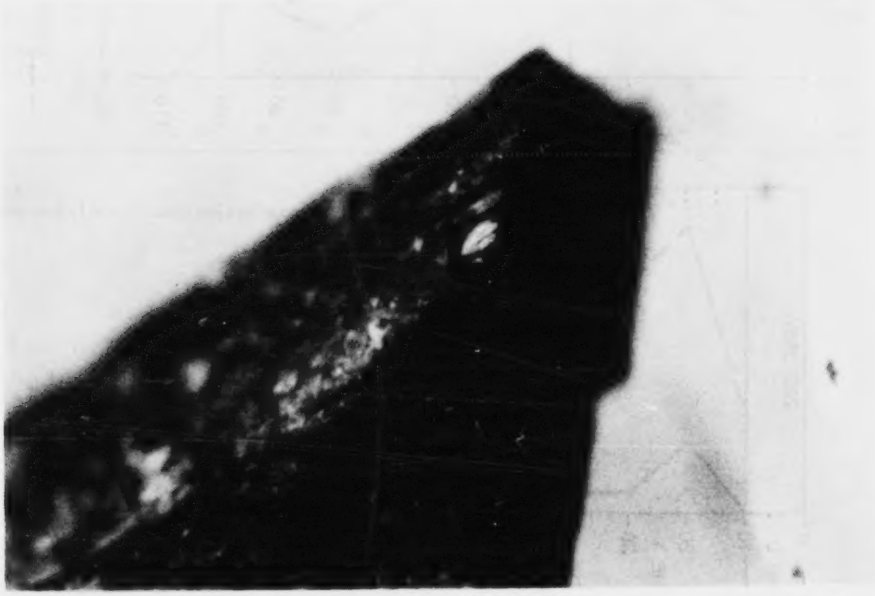


Plate 5-2. Coated artifact with pitch or resinous layer, 45-OK-2.

This is the second appearance of Helianthus in a securely dated housepit occupation floor. As mentioned in the 45-OK-288 report, the discovery of one or two sunflower achenes does not allow us to conclude that the seeds were collected for food. But it is of more than passing interest that the plants were in the Columbia River Plateau 800 to 1000 years earlier than was previously supposed.

CUPRESSACEAE (Cypress Family)

Cypress family members appeared in 12 or 36% of the flotation samples and in 48% of the radiocarbon samples.

Juniperus scopulorum Sarg. (juniper)

Charred juniper wood was found in 12% of the flotation samples and in four (16%) of the carbon samples. Juniper was found in Features 42, 49, 69, and 97 in Zone 2.

Juniper is not common within the guide-taking area. A few individuals occur on the lower Nespelem River and Coyote Canyon and there are groves on the Douglas County shoreline near RM590. The tough close-grained wood was used for bows and small construction purposes, the boughs were used to fumigate houses and the steeped bark and branch tips were used to treat colds, influenza, and other disorders (Turner et al. 1980:19-20).

Chamaecyparis nootkatensis (D. Don) Sprach (Alaska cedar, yellow cedar)

Partially charred yellow cedar was found in 6% of the flotation samples and in 28% of the carbon samples. All specimens were mature bole wood from Features 42 and 49. In condition and maturity the wood resembles that from 45-DO-214.

Yellow cedar is not presently found on the Colville Reservation. It is a coastal species with spotty distribution east of the Cascade mountains. The nearest source is the Slocan Lake region of British Columbia (Hosie 1979:102). Logs may have reached the site by river. The Slocan River does empty into the Columbia River in Canada. At least one mature log was observed in a pile of river drift collected by Coulee Dam river patrols in 1981. The bark was largely intact and the wood was in excellent condition.

Yellow cedar was used extensively by Northwest Coast Indians for a variety of purposes. It has uses similar to red cedar. Bows from the wood are said to have been desirable and were widely traded into the interior (Turner 1979:70-71). Yellow cedar bark was generally regarded as a finer material than red cedar bark for weaving, wrapping and stuffing material. Thus the wood and the bark of this cedar could serve many of the purposes that red cedar was used for in this area (see discussion of red cedar below).

Thuja plicata Donn (red cedar, western red cedar)

Incompletely carbonized red cedar wood was found in 30% of the flotation samples and 28% of the carbon samples. By weight, it is the most abundant wood in the samples examined. It was found in most unit levels and in all features except Features 69 and 100. All of the wood is from mature cedar trunks.

Three radiocarbon samples have plank sections which show smoothing or wear on one or more sides (RC 38, 83 and 195). Field records indicate that these samples are segments of large planks or boards which run parallel to the long axis of the feature in the middle and along the eastern periphery. The largest (RC 195) is at least 20 cm wide, 6 cm thick and more than 1.3 m long. It lay on the bottom of the feature against the eastern edge. A radially split cedar plank (RC 83) lay parallel to the first in the middle of the feature. It is at least 10 cm wide, 4 cm thick and 80 cm long. Other pieces of the plank (RC 81, 85) extend its length to 1.95 m. The wide face is clearly worn and the surface cells are brown. The interior cells are charred. It is probable that the worn surface was preserved uncharred by contact with the soil. The final plank or planks (RC 38) are from the south corner among a heap of other wood pieces that seemed to line the depression. The sample, 332 g, is a large one and contains charred wood which may belong to two different tangentially split boards. One of these is nearly square, and at least 3 cm broad and 3 cm thick; it has about 25 annual rings per centimeter. Two adjacent faces are smooth. The second is at least 4 cm thick and 8.5 cm broad, it has 15 rings per cm and is worn on the thick side. The piece shows considerable fire damage such as fissuring and cracking. It is possible that all the wood from the samples belonged to a single plank with narrow and wide rings. If so, the plank would have been over 7 cm thick based on actual measurments and 13 cm broad based on field drawings. Length cannot be calculated, although it must be more than 30 cm long. One end disappeared into the east wall of 26S369W.

Thus, much of the red cedar in our samples is from worked planks or boards. The position of these pieces suggest their use as structural elements in Feature 49. All of the cedar had been divested of outer bark. Soft inner bark was found in occupation debris (Flotation Sample

217) in Housepit 3 unit 24S371W and 3.4 g of inner bark was also found on the floor of Feature 49. Both partially carbonized samples lack the dense, outer bark layers. Therefore, it may be that some bark was introduced as a consequence of economic activity.

Ray observed that logs were pulled from the river to be made into canoes, paddles, or planks for semisubterranean houses, as well as bow staves and cooking utensils (1932:31,119) among other things. The outer bark of cedar was sometimes used to cover sweathouses and as insulation for other structures (Post and Commons 1938:39; Turner et al. 1980:20). Use of the inner bark does not seem to have been common although it is said to have been used as matting and basketry material (Turner et al. 1980:20). Constant supply would have been a problem. The nearest present source of cedar trees lies across the mountains at Barnaby Creek about 40 km (24 mile) north of Inchelium on the Columbia River.

Other Cupressaceae

Small samples of incompletely carbonized woods from the family appear in Zone 1 and in unassigned materials (Flotation Samples 211 and 219) and from a post mold Feature 69 (Flotation Sample 439). The pieces were too small to identify to genus.

HYDRANGEACEAE (Hydrangea Family)

Philadelphus _lewisii_ Pursh (mockorange)

Mockorange appeared in Flotation Sample 241, Zone 1 and Flotation Sample 375, Zone 2. At present, mockorange bushes are found a few meters east of the site at the base of rock and talus accumulations. The wood was a preferred material for recurved, sinew-backed bows and snowshoe frames (Ray 1932:87-88, 121) and for implements such as digging sticks, arrow shafts, and harpoon parts (Turner et al. 1980:108). It could also function as handy kindling.

HYDROPHYLLACEAE (Waterleaf Family)

Phacelia _linearis_ (Pursh) Holz. (phacelia)

Four complete charred nutlets from this showy wildflower were found in occupational debris from UL 60 and 70 (Flotation Samples 217 and 218) in Housepit 3. Ethnographic sources list no use for the plant. The plant can be used as a seasonal indicator, as it flowers in early July and seeds mature after that.

PINACEAE (Pine Family)

The pine family is well represented in the samples from 45-OK-2. All genera in the family are represented, including Tsuga and Abies which have not been seen before in our studies. All told, pine family members appeared in 24 or 73% of the flotation samples and in 48% of the carbon samples.

Abies Mill. (fir)

Three radiocarbon samples (RC 24, 34 and 73) contained incompletely charred wood from mature fir trunks. The largest sample, weighing 103 g, was found with a trace of incompletely charred juniper wood on the housepit floor in 24S368W, UL 30. The species appears to be either A. lasiocarpa, a small subalpine to alpine tree, or A. procera, noble fir. The nearest source for these trees is not known, although alpine fir is often associated with Engelmann spruce, lodgepole pine and trembling aspen (Hosie 1979:90) at elevations of from 600 to 2100 m (2000 to 7000 feet). The nearest present source for alpine fir is the western side of Armstrong mountain, 17 km (10 mi) from Nespelem at 900 m (3000 feet) elevation.

The two other samples are from the southern periphery of Feature 49. The largest is a mostly carbonized log or plank which was sitting or lodged on top of a red cedar plank(s), RC 34 (discussed above) and resting against the southern wall of the feature. There is wear on the radial surface. This piece may be a split plank much like the cedar plank beneath it.

The third fir sample was also from Feature 49. It was taken from the southwestern edge, and found with juniper wood, much like that from the floor. Unlike the floor sample, these pieces were almost totally charred.

Larix occidentalis Nutt. (Western larch, tamarack)

Larch charcoal was found in Flotation Sample 241, from occupation debris in Zone 1, and on the Feature 49 floor (Flotation Samples 434 and 435) in Zone 2. One of the latter contains a larch point, described in more detail in the section on modified artifacts.

Picea A. Dietr. (spruce)

Two radiocarbon samples from the top of Feature 49 (RC 22 and 23) contain incompletely charred spruce wood. It is most likely Engelmann spruce, P. engelmannii or white spruce, P. glauca. The nearest present source for Engelmann spruce is Disautel Pass at elevations of 900 m (3000 feet) or over. Englemann spruce is not abundant: individual trees are scattered among the lodgepole pine, larch, and Douglas firs.

Okanogan-Colville peoples apparently did not make much use of the wood in times past (Turner et al. 1980:26), although the roots were sometimes used for basket making when cedar roots were not available (Ray 1932:35).

Pinus contorta Dougl. ex Loud. (lodgepole pine)

Lodgepole pine was found on the floor of Housepit 3 in UL 20 to 60 in 24S371W (Flotation Samples 212, 213, 215 and 216). All of the samples contain pieces which are incompletely charred. It is one of five woods in hearth Feature 97.

Pinus ponderosa Dougl. ex D. Don (ponderosa pine)

Ponderosa pine wood is found in 11 (33%) of the flotation samples from Analytic Zones 1, 2, 3, and unassigned materials. The wood is not common in the Housepit 3 features, although a specimen was found in the Feature 100 sample.

Other Pine

A small amount of soft or white pine, probably *P. monticola*, was found in Flotation Sample 219, Zone 2. Yellow pine was found in 8 flotation samples (24% of the samples), all from Zones 1 and 2. The term "yellow pine" is used when speaking of samples which contain ponderosa or lodgepole pine and when species determination cannot be made. Young lodgepole pines are particularly suited for construction. Both species, however, are suitable building material, and both are good fuel. They can be found within an hour's walk of the site.

Pseudotsuga menziesii (Mirb.) Franco (Douglas fir)

Douglas fir was found in 36% of the flotation samples and in two carbon samples. It was found in Zones 1, 2, and 3, including Features 49 and 100, Zone 2. Douglas fir currently grows among ponderosa pine above the floodplain and in draws. Individuals nearest the site grow in the lower Hudnut-Coyote Creek Canyon area above 360 m (1200 feet).

Tsuga Carr. (Hemlock)

Hemlock wood was found in Flotation Sample 214, Zone 1, and Flotation Samples 215, 217, and 434 from Zone 2, the latter being from Feature 49. About 60 grams of incompletely carbonized wood were also taken from three carbon samples in Feature 49 (RC 25, 28 and 53). The wood is most likely either *T. heterophylla*, western hemlock or *T. mertensiana*, mountain hemlock. Hemlock is not locally available. The closest source probably is the Arrow and Slocan Lakes region north of Castlegar, British Columbia. Although the Indians of the Northwest Coast used hemlock wood, bark and boughs extensively (Turner 1979:113-116), the tree apparently was not used by Native Americans of our area.

Other Pinaceae

Flotation Sample 211, unassigned materials, Flotation Samples 217, 375, and 377, Zone 2, have small fragments of charcoal which belong to the pine family, but which are too small to identify further. Flotation Sample 374, Zone 2, also contained a section of three-needle pine leaf, probably from ponderosa pine.

POACEAE (Gramineae, Grass Family)

Flotation Samples 216, 217, 434 and 435, Zone 2, contained small amounts of grass stem. Seed material was found in two samples from occupation debris in Housepit 3; two unidentified fragments in Flotation Sample 217 and a seed probably from the genus _Paspalum_ or _Panicum_ in Flotation Sample 216. Charred culm material from a small stemmed grass was found on the floor of Feature 49.

RANUNCULACEAE (Buttercup Family)

Clematis L. (virgin's bower)

A small section of clematis stem was found in occupation debris in Housepit 3, Zone 2 (Flotation Sample 217). Vines of white clematis, _L. liguisticifolia_ Nutt., dot the talus slopes and draws near the site. The bark of this species was a valued weaving material for bags, mats and garments. The leaves were used as a cleansing agent (Ray 1932:45,55; Turner 1979:227-228).

ROSACEAE (Rose Family)

Members of this family appear in 20 (61%) of the flotation samples, and in one carbon sample.

Amelanchier _alnifolia_ Nutt. (serviceberry, saskatoon)

Serviceberry charcoal was found in Flotation Samples 219, 222, and 374, Zone 2. A portion of seed was found in the same zone (Flotation Sample 215). Serviceberry wood is hard and durable, suited for digging sticks, arrow shafts, seed beater frames, cooking implements and the like (Ray 1932:98; Post and Commons 1938:53, 55, 58, 60). Serviceberry bushes grow within walking distance of the site.

Crataegus L. (hawthorn, thornberry, haw)

Flotation Samples 219, 222, and 374, Zone 2 contained hawthorn charcoal. The wood is likely that of black hawthorn, *C. douglasii* Lindl. One bush was observed growing at the site. Others grow nearby. Turner states that the wood of black hawthorn was used occasionally for digging sticks, mauls, wedges and clubs, and the thorns for various piercing tasks (1979:234; Turner et al. 1980:125).

Prunus virginiana L. (chokecherry)

Six charred chokecherry pits were found, five in Feature 49, and one in Zone 3 in 26S368W. All had been gnawed open by rodents and the embryos were missing. Another small fragment was taken from Flotation Sample 374, Zone 2.

According to Post, chokecherry fruits were gathered in mid-August and often were treated like serviceberries, dried on mats and stored whole. Alternately, they could be pounded with salmon by-products such as heads, tails, or eggs (1938:28). Ray notes that chokecherries were used fresh, and that unseeded, mashed fruits were mixed with pulverized, dried salmon and stored (1932:101). Turner reports similar treatment except that she does not mention seed removal (Turner et al. 1980:127-128). In the last three years, chokecherries ripened in mid-August in the area near the site. Harvest-time arrives during the last week of August. The best source for these fruits is in Coyote Canyon where they grow in profusion along with serviceberry, hawthorn, oregon grape (*Berberis acquifolium*), and squaw currant (*Ribes cereum*) along the creek bed.

Purshia tridentata (Pursh) D.C. (bitterbrush, greasewood)

Bitterbrush charcoal was found in 11 (33%) of the flotation samples and from one radiocarbon sample (RC 23) taken near the top of Feature 49. Charcoal was present in Analytic Zones 1, 2 and 3. A portion of a possible bitterbrush seed was found in Flotation Sample 217, occupation debris in Housepit 3.

Bitterbrush wood apparently was not utilized for tools or other items; the southern Okanogan reportedly used it to create a hot fire, particularly in the initial stages of making an earth oven (Turner et al. 1980:128). The plant is common at the site particularly at the base of the hills and talus slopes.

Other Rosaceae

Flotation Sample 374, Zone 2, contained charcoal which may be either serviceberry or hawthorn. Five others from Zone 1 (Flotation Sample 214), 2 (Flotation Samples 216, 217 and 219) and Zone 3 (Flotation Sample 223) contained charcoal which belong to the family Rosaceae.

SALICACEAE (Willow Family)

Populus L. (poplar, aspen)

Flotation Sample 241 contained aspen charcoal. The species is most likely quaking aspen, _P. tremuloides_ Michx. Quaking aspen is abundant in draws, and large individuals can be observed in all parts of Coyote Canyon. Aspen was used extensively in fish weir construction (Ray 1932:62) and large logs were often preferred as support in the hide-scraping process (Turner et al. 1980:134). Aspen may also have been used in the building of storage containers and as fuel (Post 1938:31; Turner 1979:258).

Salix L. (willow)

Although willow is similar to poplar in its habitat, abundance and wood structure, much more willow than poplar was recovered from 45-OK-2. Charred and incompletely charred willow was found in flotation samples from Analytic Zone 1 (Flotation Sample 212) and 2 (Flotation Samples 215 and 216). It was also found in three radiocarbon samples (RC 28, 29, and 119) in Zone 2. Two of the samples weighing about 31 g were incompletely carbonized. The pieces were large. Those that could be measured were about 7 cm in diameter. The location of these large pieces at the top of Feature 49 suggests they were structural members.

Three flotation samples contained willow or aspen wood which could not be further identified. Altogether, willow and aspen appeared in 18% of the flotation samples and 8% of the carbon samples.

TAXACEAE (Yew Family)

Taxus brevifolia Nutt. (yew)

Incompletely carbonized yew wood was found in five flotation samples from Analytic Zone 1 (Flotation Samples 213 and 372) and Zone 2 (Flotation Samples 215, 218, and 220). The nearest source for yew is not known. It prefers moist forest soil and is most likely to be found on well-watered flats along streams in the Selkirk Mountains, British Columbia (Turner 1979:116-117). Yew may have reached the site by water. It is as likely, however, that our pieces represent material traded from the north or west (Turner 1979:116-117).

Yew wood has exceptional bending strength and hardness. Native terms for the wood may refer to past use as bow material in our area. The only specific uses for yew mentioned in the ethnographic literature are in red dye preparation (Ray 1932:52) and in skin salve preparation (Turner et al. 1980:35).

ULMACEAE (Elm Family)

Celtis douglasii Planch. (hackberry)

Hackberry charcoal occurred in Flotation Sample 218, Zone 2. A portion of charred hackberry leaf was found in Flotation Sample 377, from the same zone.

Hackberry shrubs and small trees dot the local area, and are numerous at the base of rock and talus accumulations along with rose, mockorange and serviceberry bushes. One small tree grows on the site today. Although the wood is not mentioned in regional ethnobotanies, it is used now for the same commercial purposes as elm and white ash (Panshin and de Zeeuw 1980:578). It is a hard and durable wood.

OTHER WOODS AND TISSUES

Over 66% of the flotation samples had conifer wood which could not be identified to genus, and 12% had hardwood which could not be further identified. Herbaceous stem material occured in 33% of the flotation samples and in all Zones. At 1% of the botanical weight, it weighs as much as many of the hardwoods. A little conifer bark was found in all zones. Its weight is negligible when compared to the weight of conifer wood in the flotation samples and carbon samples. One flotation sample (218) from Zone 2 contained a trace of rootlike tissue. It was found in occupation debris which contained serviceberry, sunflower and grass seeds. It resembles lomatium tissue. Of the 16 seeds recovered from all samples, two remain unidentified. One found among cherry pits on the floor of Feature 49 is fragmentary. Surviving portions are grooved and folded in a manner similar to seeds of the grape family. The other is a complete charred seed that may belong to the mustard family.

Two charred fragments were recovered in Zone 2. One is a section of a ponderosa pine needle. The other is a portion of hackberry leaf mentioned previously.

MODIFIED ARTIFACTS

A flotation sample from charcoal flecked soil around and under a wood concentration on the floor of Feature 49, contained a charred larch plano-convex point broken in at least four sections. Pieced together, the artifact is 2.6 mm broad at the widest point, and 1.1 mm thick at the highest point. It is 10 mm long, but could be longer since the wide end is broken. The object resembles half of a long cone and is carefully smoothed on all sides. Other than being completely charred, the wood cells are in excellent condition. The function of the object is unknown.

The most interesting piece of unidentified conifer wood is a small fragment which was painted or dipped in a dark resinous substance like pitch (Plates 5-2 and 5-3). It was found close to Feature 100 in Zone 2. The artifact is 0.5 mm thick, but the original length and breadth is unknown. Its present length is 2.8 mm and its breadth is 1.0 mm. Surface treatment extends to the three remaining faces. The applied substance has penetrated surface cells for some distance into the wood; a broken edge shows a conchoidal fracture which is characteristic of hardened pitch. The use of pitch, particularly pine pitch, is mentioned in the ethnographies. It is used as a glue in arrow making, harpoon construction (Post and Commons 1938:53, 56-57) and in fastening bow handles (Ray 1932:88). So little of the artifact remains that its function cannot be surmised.

Finally, a fragment of Z-twist fiber of cordage (Plate 5-4) 0.3 mm wide by 3.4 mm long was found in occupation debris (Flotation Sample 219) near the resin coated artifact described above. The material may be botanical in nature. It does not appear to be made from Indian hemp or other fine fibers such as nettle or milkweed. The possibility exists that it may be carbonized sinew, hence the question mark in Table 6-1.

ZONE 4

No carbon was found in the single flotation sample examined from Zone 4.

ZONE 3

The five flotation samples and a carbon sample (Master Number 3132) from Zone 3 were all taken from nonfeature levels. The flotation samples yielded 0.04 g of carbonized remains, 66% of which was conifer wood--pine, fir, and red cedar--and 33% was bitterbrush, sage and Serv/haw charcoal (Table 5-1). A trace of herbaceous material was found in one of the samples. The carbon sample consisted of a single charred chokecherry pit retrieved from unit level materials (Table 5-2).

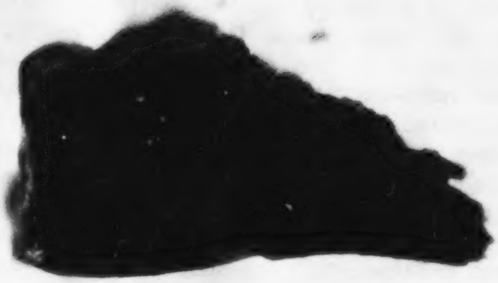


Plate 5-3. Close up of coated artifact showing surface penetration (width 0.5 mm).

Plate 5-4. Twisted cordage or sinew thread (width 0.3 mm).

The flotation samples from this zone have very low purity ratings, from 4 to 10% by weight, and low carbon ratios generally less than .001% (Figure 5-1). Contaminants in the samples consisted of cultural material such as shell and unburned bone.

ZONE 2

Diverse botanical remains came from Zone 2. Seventeen flotation samples from four units contributed 3.85 g of archaeobotanical materials (75% by weight of all flotation samples examined) and 24 carbon samples (of 25 total from all zones)totalled over 1037 g. The flotation assemblage (Table 5-1) consists of 73% conifer, 24% hardwood, less than 1% edible material, and 3% other tissues. The carbon samples, most of which were taken from Features 42 and 49, consist of 98% conifer, 2% hardwood, several cherry pits and an unknown seed (Table 5-2).

Housepit 3

Housepit 3 is a circular, semisubterranean pit house eight meters in diameter. It was only partially excavated, revealing a floor with which were associated two postmolds, a hearth, and a pit containing a human cranium. A radiocarbon date of 1112±95 B.P. (B-4275) was obtained from the hearth. The samples examined from Housepit 3 include some from the floor as well as some from the fill, which also is assigned to Zone 2.

A separate occupation layer in the fill is suggested by the amount and diversity of botanical materials in flotation samples from 24S371W. About 1.81 g of botanical remains were taken from 20.6 kg of soil, for a carbon:noncarbon ratio of 0.04%. Two vertically separated peaks occurred in the zone. One at the top in UL 50 and 60--in the housepit fill--contained the majority of edibles such as sunflower and serviceberry seeds as well as textile materials such as cedar bark and clematis tissue. The second peak in UL 90 and 100 is associated with the housepit floor.

Samples from the burial pit (Feature 100) and the hearth (Feature 97) were also examined. The radiocarbon sample from the hearth, dated at 1112±95 B.P. was juniper and lodgepole pine wood. The piece of twisted cordage and the resin coated artifact were found near each other on the floor close to Feature 100.

Structure N

Four flotation samples and a number of carbon samples were taken from features associated with Structure N. This subsurface pit is 3 m wide by at least 5 m long and rectangular in plan, although one end is more rounded than square. The long axis is oriented grid northeast by southwest. Nearly the entire structure, called Feature 49 in the field, was excavated. Portions of two long and one short side were uncovered in 26S369W, 24S368W and 26S67W in unit levels 30 to 80. The bottom and portions of the sides along the south half of the structure are well defined. One portion of the upper wall was excavated as Feature 42. A postmold, Feature 69, located on the periphery of the structure in 26S368W is thought to be associated with the structure. Large quantities of wood, some of it in the form of planks, were encountered during excavation. The botanical analysis provides considerable detail about the structural remains, as well as occupation debris on the floor.

The amount, condition, and kinds of woods taken from carbon samples in Feature 49 is remarkable. Over 4.3 kg was available for study as radiocarbon samples. About 19% by weight were identified. Very little bark is represented, indicating that most of the structural members of the feature had undergone debarking. Nearly all of the wood is mature trunk or bole wood. A great deal of it is incompletely carbonized, non-local species such as red cedar, yellow cedar, subalpine fir, spruce and hemlock. Much of the cedar and some of the fir appears worn or modified. A specimen of large diameter willow branches or trunk material has been dated to 839±68 B.P. (B-2524).

Over 80% of the radiocarbon samples were taken from the southwestern portion of the structure, where the density of partially carbonized wood exceeds 7 kg/m^3. The density of wood decreased from the southeast to the center and from the northwest to the center. The least wood (98 g) as measured by carbon samples is along the southeastern wall.

Field records indicate large planks or boards running parallel to the long axis of the feature in the middle and along the eastern periphery. Radiocarbon samples taken from these planks are described in detail in the previous section. They include several specimens of red cedar, all of which are mature bole wood with the outer bark removed, and evidence of smoothing or wear on one or more sides. The largest plank, at least 20 cm wide, 6 cm thick, and more than 1.3 m long, lay on the bottom of the feature against the eastern edge (RC 195). Parallel to this, in the middle of the feature, was a radially split cedar plank 10 cm wide, 4 cm thick, and at least 1.95 m long (RC 81, 83, and 85) with wear on the wide face. The interior cells are charred, but not the worn surface, which was evidently preserved by contact with the soil. Two more tangentially split boards (RC 38) lay in the south corner, where a heap of wood pieces seem to line the depression. One is nearly square--3 cm in breadth and thickness--and has about 25 annual rings per cm. Two adjacent faces are smooth. The second, 4 cm thick and 8.5 cm broad, has 15 rings per cm and is worn on the thick side. Considerable fire damage--fissuring and cracking--is evident. If both pieces are from a single plank with both narrow and wide rings, the plank would have been over 7 cm thick (direct measurements), and 13 cm broad (estimated from field drawings). Only 30 cm of the plank's length was exposed; the other end disappeared into the east wall of 26S369W. On top of this (these) cedar plank(s) was lodged a mostly carbonized plank of fir that rested against the southern wall of the feature. It is a piece of mature trunk wood with wear on the radial surface.

Smaller fragments of red cedar and fir were found in other samples from Feature 49. Specimens of mature bole wood of yellow cedar do not show evidence of modification and were not found in the form of large planks, but the exclusive association of this wood with Structure N indicates it also was used in the construction. The same is true of spruce, two samples of which were found at the top of Feature 49. The large diameter of the willow trunk wood found at the top of the feature suggests it was a structural member. Hemlock and Douglas fir also occur, although these woods are found outside Structure N as well.

The woods represented in Feature 42 duplicate the unusual mixture of nonlocal species found in Feature 49. The flotation sample contained only yellow cedar, and the three carbon samples, totalling over 200 g, include a mixture of subalpine fir, red and yellow cedar, and juniper.

The flotation sample from Feature 69 contained small bits of pine, cypress family wood, and serv/haw charcoal, suggesting that the post may have been removed and the mold empty for a time.

Flotation samples taken near the bottom and on the floor of Feature 49 contained larch, fir, yew, cedar, and sage charcoal. A specimen of the soft inner bark of red cedar, as well as the pointed larch artifact were found in the floor samples. Small carbonized grass stems constitute 4% of the sample weight. Except for red cedar, the woods in the flotation samples differ from those in the carbon samples which represent the superstructure. Edible material in the form of charred cherry pits was also found on or near the floor.

Photos and drawings show that at least one, and possibly two, vertical elements or posts about 5 cm in diameter were just inside the rim at the southeastern corner. Other units in which major load-bearing structural elements might be expected were not excavated. Thus it is not possible to know whether the structural supports consituted an A-frame or mainpost-and-rafter superstructure. An A-frame structure is more likely given the fact posts would be more stable were they located in the depression where they could be braced against a wall. However, the structure Ray describes as having the same width as ours (eight or nine feet) is a flat-topped summer lodge (1932:34), not an A-frame. He does not mention that such dwellings were constructed over depressions, though he does indicate that such structures might be covered with grass, brush, or matting on the top, sides, and back (that is, the side away from the river). The, front facing, the river was left open (Ray 1932:34). The width of such a structure was influenced by the length of beds placed against a wall and the passageway at the foot of them. Other summer dwellings with rectangular plans and flat mat-covered roofs are discussed by Post and Commons (1938:41). They also note that any tree except pine might be used. As Table 5-2 shows, there is no pine in Feature 49, but almost every other conifer species found at the site is represented there.

In short, Feature 49 appears to be a small summer dwelling. The discovery of several whole cherry pits suggests late summer occupation. Absence of quantities of matting, grass or brush in the flotation or carbon samples suggest that the structure may have been abandoned before it caught fire.

Other Samples

Samples from unit levels outside Structure N and Housepit 3 were also examined. Unit 18S370W--on the northern periphery of Housepit 3--contributed 0.16 g of archaeobotanical remains from 14 kg of soil in four samples. The carbon peaks in levels 40 through 60 at about 0.06%. The identified specimens are a mundane assortment--pine, Douglas fir, red cedar, serviceberry, mockorange and serv/haw wood. In addition, a portion of a cherry pit was found among the woods. Unit 28S368W had one flotation sample in this zone which contained a trace of conifer and a small amount of herbaceous stem material.

ZONE 1

Dense occupation debris was found in Zone 1 in the Housepit 3 area, dated to the historic period by horse bones, a metal button, and a shell button. Possibly, a surface structure was erected in the depression overlying Housepit 3.

Zone 1 is represented by seven flotation samples which were collected from nonfeature levels in 18S370W and 28S368W. Flotation samples from the corresponding levels of 24S371W were examined but are not included here because they may contain backdirt from Osborne's excavation. The botanical remains from the flotation samples weighed 0.38 g, 7% of the botanical material from the site. The zonal carbon:noncarbon average is 0.01% which is not as high as Zone 3. Carbon purity ranged from less than 1% at the top of the zone in 28S368W to nearly 100% at the top of the zone in 24S371W. The assemblage comprises 13% conifer, 84% hardwood, and 3% herbaceous material. No edible material was found in these flotation samples. Among the conifers, the pine family is well represented. Pine and Douglas fir are the most abundant. Pine family members appeared in five (63%) of the flotation samples. Red cedar and yew are also present. Bitterbrush, the most abundant hardwood, was found in 50% of the flotation samples. Sage, mockorange, hawthorn and poplar were also present.

BOTANICAL REMAINS FROM 45-OK-2A

As systematic flotation samples were not collected at 45-OK-2A, botanical remains were available only from radiocarbon samples, miscellaneous charcoal saved in level bags, and soil samples. More carbon samples were available from features than other areas, so we chose to focus the analysis on four features from Zone 2. They are represented by approximately 30 g of charred and incompletely charred material from 17 radiocarbon samples and miscellaneous charcoal extracted from level bags. A list of plant families, genera and species is presented below. Environmental, seasonal and use data can generally be found in the previous section dealing with 45-OK-2 families. Woods which were incompletely charred are indicated with an asterisk (*). The assemblages are described by feature in a following section.

PINACEAE (Pine Family)

Pinus ponderosa Dougl. ex Loud. Ponderosa pine* needle fragments and wood were found in 12 out of 17 samples and in all three pit features.

Pseudotsuga menziesii (Mirbel) Franco. Douglas fir* appeared in four samples and in all features but one pit.

Larix Adans. The larch* present is probably *L. occidentalis*. It appeared in four samples in one subsurface pit.

Picea A. Dietr. Completely charred spruce wood was found once.

P. contorta Dougl. ex Loud. A small amount of yellow pine was found in one pit feature.

ROSACEAE (Rose Family)

Amelanchier alnifolia Nutt. A portion of a seed coat was found in one pit feature along with some rootlike material.

Crataegus L. Hawthorn* wood appeared in two samples from a single subsurface pit.

Purshia tridentata (Pursh) D.C. Bitterbrush charcoal appeared in two pit features. No seeds were encountered.

SALICACEAE (Willow Family)

Populus L. Aspen* was found in one sample. Although the sample was a large one, no species identification was possible. Members are notoriously difficult to separate on the basis of wood morphology.

ULMACEAE (Elm Family)

Celtis douglasii Planch. Hackberry* wood appeared twice in the same subsurface pit.

ZONE 2

The seventeen Zone 2 samples are from four features; pit Feature 2, oven Feature 5, floor Feature 10, and pit Feature 20. Each feature was found to contain a unique combination of botanical materials. Feature 2 held a combination of locally available fuel woods and an unidentified organic residue. Conifer branches and food remains were found in Feature 5. The Feature 20 contents were a diverse mixture of partially charred hardwood and conifer charcoal. The combination as well as the condition of the wood suggests an accumulation of camp trash rather than a fuel mixture. Feature 10, the floor of Housepit 8, is represented by one sample of Douglas fir charcoal.

Incompletely charred wood was found in Features 5 and 20. This is not uncommon in the study area: the oldest example is from a zone dated to 1,500 years ago at 45-OK-288. Many of the 45-OK-2 samples from Structure N, dated around 800 B.P. are also incompletely carbonized. The absence from this assemblage of non-woody tissue such as grass stems, and herbaceous material is probably attributable to the kind of samples analyzed, not to their absence at the site.

Feature 2

Feature 2, in 38N46E, was a pit at least 70 cm deep with a diameter estimated to be over one meter. It was filled with a dark matrix and the principal contents were fish bone. Three miscellaneous charcoal samples were examined. A sample from UL 90 at the top of the pit consisted of 0.05 g of ponderosa pine bole and branch charcoal and bits of non-vegetal organic material weighing 0.01 g. Two samples from UL 130 near the bottom of the pit yielded a trace of ponderosa pine charcoal, a small amount (0.01 g) of yellow pine charcoal and 0.04 g of bitterbrush charcoal, as well as more than 0.04 g of the same unidentified organic material occurring in the upper sample. One of the samples consisted of 92% rootlets, surprisingly high for a depth of 130 cm below the surface. This is the level with most fish bone, suggesting that the roots have been attracted by the organic content.

Pine and bitterbrush charcoal are combined in this feature, as they also are in Feature 5. The co-occurrence of pine and hardwood shrubby species is not uncommon in other project sites. We believe the woods were burned as fuels. The combination of wood and faunal material suggest midden accumulation.

Feature 5

Feature 5 is a small earth oven--40 cm x 34 cm in plan and 32 cm deep--in 42N52E. The pit had been filled with heat retaining rocks and the upper portion of the feature had been subjected to great heat, burning the earthen walls to a thickness of 3 to 8 mm. A fibrous lining which curved in at the top was noted in excavation.

A large amount of conifer charcoal and incompletely burned wood was recovered from this feature as well as the only edible plants in Zone 2. The assemblage (Table 5-3) represents a little over 23 g of the 86 g taken from the feature in radiocarbon samples, and miscellaneous carbon bits taken from feature level bags. No proper flotation samples were taken from this feature, but two samples of soil of unknown weight (M5 and M6) remaining after charcoal was removed for radiocarbon samples, were subjected to water separation.

These two samples provided all of the recovered fir, conifer pith, hardwood, parenchymoid, needle, and edible tissues, and most of the unidentified tissue.

Eighty-two percent of the archaeobotanical remains by weight were from the bottom 10 cm of the oven. Most is ponderosa pine branch wood. Many pieces are from 1 to 3 cm in diameter and, judging from the large amount of bark present, must have been bark covered. Some larch also is branch wood. Nearly all samples from this area of the hearth contain wood which is incompletely carbonized. Delicate materials such as ponderosa needle fragments, conifer twig ends and fragments of the pithy cortex of branches have been preserved in good condition. Two completely carbonized edibles were found; root or rootlike material which cannot be further identified due to its small size, and the seed coat, lacking an embryo, of a crushed serviceberry achene. The parenchymoid tissue is similar to the pith found inside ponderosa pine branches. The unidentified material is more difficult to place. It may not be botanical in nature, but it is not the same kind of organic material found in Feature 2.

The fibrous lining noted in excavation evidently was comprised of ponderosa pine branches, twigs, and needles. The combination of root and crushed seed found in Feature 5 suggests the possibility of a dried preparation made for winter use (Post 1938:25,27; Ray 1932:100-101; Turner et al. 1980:123). As in Feature 2, bitterbrush and ponderosa pine charcoal were found in combination.

Feature 10

Feature 10 is an occupation floor in Housepit 8. A miscellaneous charcoal sample from a bone and shell scatter in UL 70 consisted of 0.01 g Douglas fir.

Feature 20

Feature 20, in 48N28E, is a portion of a pit at least 50 cm deep and estimated to be more than one meter in diameter. Originating from the floor of Housepit 8 (Feature 10), the pit was filled with a dark stained matrix containing bone, primarily fish bone, and charcoal. Three samples from the feature were examined. A radiocarbon sample (RC 25) consisted of 0.10 g of larch charcoal taken from among bone and charcoal fragments. Two other samples contained a mixture of charcoal and incompletely carbonized woods. These include ponderosa pine and spruce charcoal with a combined weight of 0.07 g, incompletely charred aspen wood at 0.87 g. They also contained 0.04 g of hardwood bark and pithy cortex from hackberry or hawthorn branches. Some of the hackberry wood was hardly charred at all. At least some of the surface layers were translucent brown, although quite friable. The hardwoods outweigh conifers 14 to 1.

This assemblage differs from that of the other features, as it contains woods which may have been collected for construction rather than fuel. Spruce and larch--perhaps available only as driftwood--have both been used for construction. Hawthorn and hackberry, which grow on the site today, and aspen, which borders one of the lower Coyote Creek channels, also have uses other than fuel. Given the multiple uses of these woods, and the fact that some specimens were completely carbonized and others hardly at all, the assemblage is probably general camp refuse.

Table 5-3. Botanical assemblage from Feature 5, 45-OK-2A, by weight (g)and number of appearances (#).

Identified Botanical Materials		Feature 5 N=10	
Class	Type	g	#
Conifer (99%.6%)	Ponderosa pine	21.84	9
	Douglas fir	0.13	2
	Larch	0.26	4
	Bark	0.63	6
	Conifer Pith	0.04	1
	Needle	-0.01	1
	Other Conifer	0.06	3
Hardwood (.04%)	Bitterbrush	0.01	1
Edible Tissue (.01%)	Root	0.01	1
	Seed Coat	0.01	1
Other Tissue (.02%)	Parenchymoid	0.01	1
	Unidentified	0.03	2

6. FEATURES

Knowledge of the structure and content of features increases our understanding of the prehistoric activities that took place at the site. Consequently, features were excavated separately and their contents were recorded separately from unit level materials. Methods and procedures used in excavation and analysis of features and their contents are described in the project's research design (Campbell 1984d).

The cultural features found at 45-OK-2 and 45-OK-2A are chiefly small discrete features such as hearths and bone concentrations, but occupation surfaces, larger features characterized by dense cultural materials and often containing smaller features, also were recorded. Associations consisting of an occupation surface circumscribed by evidence of construction, such as post molds or excavated walls, are the remains of constructed shelters or houses. Houses also are "features", but they present special tactical problems in recovery and analysis, and play a particularly important role in interpreting cultural occupations. They are therefore discussed separately in the following chapter. All smaller feature types, including ones that may be components of houses, are discussed in this chapter. As some of these are used in recognizing houses, it is important to discuss their structural characteristics and contents independently to avoid circularity. Also, none of the feature types occur exclusively in houses except house floors, and this is simply a matter of definition (see discussion of house floors, this chapter).

FEATURE CATEGORIES

On the basis of structural characteristics and contents, we have divided the features into 13 groups (Table 6-1). The members of each group are described briefly below. Table 6-2 lists the features at each site by zone and feature type. Table 6-3 summarizes the average density of bone, shell, FMR and lithic artifacts for the features at each site by type. The density data is also presented in graph form for selected 45-OK-2 feature types (Figure 6-1). The occurrence of nonlithic artifacts is summarized in Table 6-4, and worn and manufactured lithics in Table 6-5.

HOUSE FLOORS

House floors are occupation surfaces which conform to structural boundaries. This distinction is very dependent on tactical matters, particularly the horizontal extent of exposure. Comparative studies of

Table 6-1. Summary of structural traits and contents of feature types.

Feature Group	Relationship to Surface of Origin	Boundary Shape	Boundary Abruptness	Contents	Internal Structure of Contents
House Floors	Surface	Regular	Abrupt	Dense, diverse	Structured
Occupation Surfaces	Surface	Irregular	Diffuse	Dense, diverse	Structured
Pits	Subsurface	Regular	Abrupt	Variable	May be structured
Postholes	Subsurface	Regular	Abrupt	None or remains of post	Unstructured
Ovens	Subsurface	Regular	Abrupt	Variable amounts of FMR, charcoal, ash	Structured
Hearths	Surface	Regular	Abrupt	Variable amounts of FMR, charcoal, ash	Structured
FMR Clusters	Surface	Regular	Abrupt	Predominantly FMR	Unstructured
FMR Scatters	Surface	Irregular	Diffuse	Predominantly FMR	Unstructured
Bone Scatters[1]	Surface	Irregular	Diffuse	Predominantly bone	Unstructured
Shell Lenses	Surface	Irregular	Diffuse	Predominantly shell	Shell may be stacked
Oxidized Soil	Subsurface	Irregular	Diffuse	None—burning is postdepositional	Unstructured
Dark Stain	Surface	Irregular	Diffuse	Variable	Unstructured
Rock Cluster	Surface	Regular	Abrupt	Non-FMR rock	Unstructured

[1] **Bone scatter** is used interchangeably with **bone concentration** throughout this chapter. This apparent paradox arises because the bone is concentrated in the feature, relative to surrounding matrix, but has no apparent structure, i.e. is scattered.

Table 6-2. Assignment of features to zones and types, 45-OK-2 and 45-OK-2A.

Object Type	45-OK-2 Zone				45-OK-2A Zone	
	1	2	3	4	1	2
House Floors[1]	Houses 6, E, F	Houses 2, 3, 4, 5, G, L, M, N	Houses I, K		–	Houses 8, 9, Z
Occupation Surfaces	-	-	-	-	9/17	-
Post Molds	12, 81/83	22, 46, 69, 107, 131, 133	55, 56	-	-	-
Pits	129	41, 60, 93 100, 123	-	-	-	2, 18, 20, 21
Ovens	8/11, 71, 74, 122	58	78, 86, 108	50, 79	-	5
Hearths	95	57, 97, 114 115	98	13, 35	-	-
FMR Clusters	45, 120	63, 80, 84, 85, 132,134	106, 113, 124 128	30	13	-
FMR Scatters	1/2, 5, 6, 7, 53, 112, 118, 119,126	15, 26, 121 125	17, 54	-	1, 6, 7 12	-
Oxidized Soil	-	16, 28	14	24, 62	22	-
Dark Stains	44	61	-	23	-	-
Shell Layers	-	-	21, 34, 102 104, 110, 111 116	18, 20, 31 32, 36, 43, 47, 48, 59 73, 75, 82 117	-	-
Bone Scatter	39	33	-	-	-	-
Rock Cluster	94	72	-	-	-	-

[1] For feature numbers assigned to house floors, see Table 7-1.

Table 6-3. Density of feature contents by feature type, 45-OK-2 and 45-OK-2A.

Feature Type	N	Statistic	Bone Density		Shell Density[1]		Lithic Artifact Density	FMR Density	
			grams/m^3	count/m^3	grams/m^3	hinge count/m^3	count/m^3	grams/m^3	count/m^3
House Floors	13	$\bar{x}$	56.8	183.5	1.3	9.7	17.8	2,304.2	10.9
		s.d.	91.4	310.2	4.2	20.6	20.0	4,205.8	14.0
House Floors (45-OK-2A)	3	$\bar{x}$	50.8	109.3	-	5.5	6.2	430.4	2.5
		s.d.	57.2	113.1		8.9	5.3	491.0	3.0
Occupation Surfaces (45-OK-2A)	1	$\bar{x}$	75.2	315.1	-	0.2	38.0	2,497.3	26.8
		s.d.	106.4	445.3		0.2	51.1	3,531.7	37.9
Postholes	10	$\bar{x}$	4.4	29.6	0.4	0.5	6.6	1,333.2	2.2
		s.d.	10.0	67.2	1.5	1.4	19.8	3,071.8	3.2
Pits	6	$\bar{x}$	6.8	100.0	3.0	5.6	3.9	2,286.3	2.6
		s.d.	8.3	187.0	6.2	9.4	3.4	5,430.0	4.7
Pits (45-OK-2A)	4	$\bar{x}$	7.8	57.2	-	0.1	1.2	542.2	3.8
		s.d.	8.4	80.7		0.3	1.4	734.6	4.2
Ovens	10	$\bar{x}$	2.7	12.8	78.6	21.6	4.1	5,703.1	16.2
		s.d.	3.4	11.5	258.9	37.7	5.7	13,642.2	20.1
Ovens (45-OK-2A)	1		-	0.7	258.9	-	-	3,961.3	9.7
Hearths	8	$\bar{x}$	4.7	40.8	-	7.9	6.0	28,601.3	55.5
		s.d.	8.6	59.7		21.5	5.7	38,843.5	95.0
FMR Clusters	12	$\bar{x}$	5.0	22.7	-	13.1	5.7	17,302.5	27.8
		s.d.	5.9	30.5		19.4	7.0	28,172.3	20.4
FMR Clusters (45-OK-2A)	1		11.0	29.0	-	-	7.0	1,435.0	32.0
FMR Scatters	15	$\bar{x}$	15.4	79.5	0.0	4.7	9.5	15,152.0	51.2
		s.d.	30.1	188.0	0.1	17.2	11.7	18,204.4	35.7
FMR Scatters (45-OK-2A)	4	$\bar{x}$	5.3	22.9	-	-	27.1	4,420.2	35.7
		s.d.	10.6	45.9			54.3	1,309.6	15.1
Oxidized Soil	5	$\bar{x}$	9.4	17.3	-	13.5	16.0	372.6	3.2
		s.d.	15.1	15.8		26.4	30.1	555.0	3.2
Oxidized Soil (45-OK-2A)	1		1.7	24.1	-	-	1.7	69.0	1.7
Dark Stains	3	$\bar{x}$	14.0	74.0	-	2.7	10.0	-	-
		s.d.	20.9	114.5		3.1	9.2		
Shell Layers	10	$\bar{x}$	33.3	80.7	218.0	562.5	5.6	1,215.1	7.2
		s.d.	43.6	138.0	685.3	437.6	7.5	1,887.0	5.5
Bone Concentrations	2	$\bar{x}$	182.0	1,257.0	-	-	6.0	210.0	4.0
		s.d.	76.4	1,082.1			2.8	297.0	5.7
Rock Clusters	2	$\bar{x}$	1.0	10.0	-	-	-	3,780.0	3.0
		s.d.	1.4	14.1				5,345.7	4.2

[1] Shell weights not taken at 45-OK-2A.

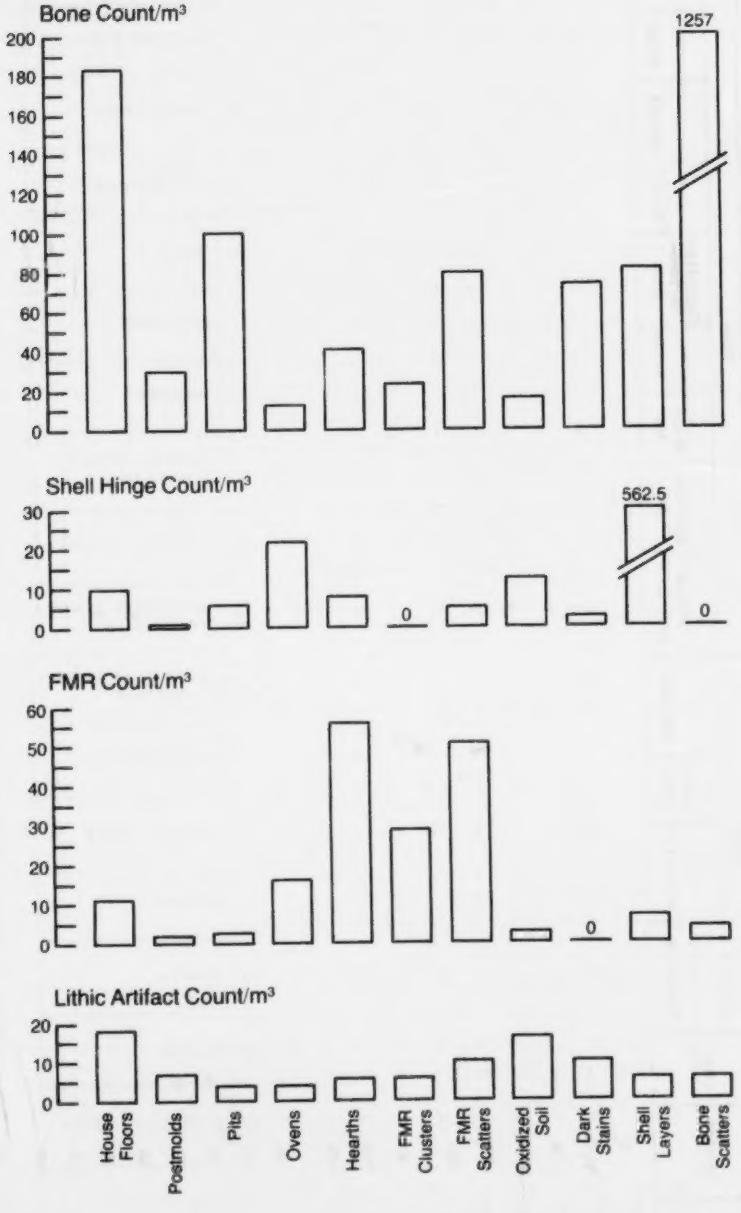


Figure 6-1. Density of feature contents by type, 45-OK-2.

Table 6-4. Occurrence of nonlithic artifacts by feature type, 45-OK-2 (historics not included).

Feature Type	Feature	Ocher	Shell				Bone								
			Dentalium	Olivella	Disc Bead	Debitage	Flaked Long Bone	Splinter Awl	Blunt Awl	Valve	Composite Harpoon Point	Point	Needle	Wedge	Incised Tube
House Floors	9	-	1	-	-	-	-	-	-	-	-	-	-	-	2
	19/65	-	-	-	-	2	-	-	1	-	-	1	-	-	1
	29	1	-	-	-	3	-	-	-	-	-	-	-	-	-
	42/49	-	-	-	-	1	3	1	-	-	-	-	-	-	1
	200	1	-	-	-	-	2	-	-	-	-	-	-	1	1
	600	3	-	-	-	-	-	1	-	3	1	-	-	-	5
Pits	60	1	-	-	-	-	-	-	-	-	-	-	-	-	-
	100	3	-	-	-	-	1	-	-	-	-	-	-	-	-
	123	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Shell Layers	18	-	-	-	-	1	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	1	-	-	-	-	-	-	-	-
	32	2	-	1	-	-	-	-	-	-	-	-	-	-	-
	47	2	-	-	-	-	-	-	-	-	-	-	-	-	-
	48	-	-	-	-	-	1	-	-	-	-	-	-	-	-
	59	-	-	-	-	-	1	-	-	-	-	-	-	-	-
	104	-	-	-	1	-	-	-	-	-	-	-	-	-	-
	110	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Bone Scatter	39	-	-	-	-	-	1	-	-	-	-	-	-	-	-

Table 6-5. Occurrence of shaped and worn lithics (functional types by feature types), 45-OK-2.

Feature Type	Projectile Point	Biface	Graver	Scraper	Tabular Knife	Burin Spall	Bifacially Retouched Flake	Unifacially Retouched Flake	Utilized Flake	Amorphously Flaked Cobble	Chopper	Netsinker	Anvil	Edge-Ground Cobble	Hammerstone	Milling Stone	Total
Floors	15	46	1	2	26	1	14	21	63	2	5	-	3	1	5	-	205
Postholes	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	3
Pits	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Ovens	3	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	5
Hearths	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	2
FMR Clusters	2	-	-	-	2	-	-	-	-	-	-	-	-	-	2	-	6
FMR Scatters	2	3	-	-	4	-	2	1	6	-	1	1	1	-	1	3	24
Oxidized Soil	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	3
Dark Stains	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Shell Layers	2	6	2	-	6	-	3	4	4	1	1	-	-	-	4	1	34
Bone Scatters	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
Rock Clusters	1	-	-	-	2	-	-	-	-	-	-	-	-	-	2	-	5

exterior and interior occupation surfaces are needed to determine if there are formal differences other than association with structural evidence.

Even though the house floor surface may be artificially constructed, as in a housepit, they may be considered surface features. Generally, they are characterized by a relatively high density of cultural material and organic staining. However, they are internally structured, comprising features of varying discreteness which reflect different activities.

Excavation recovery of structure floors involves a different set of tactical problems than those attending excavation of smaller features. Because of their large size and internal variability, and the lack of structural evidence except at the boundaries, structure floors may not be recognized or recorded as single features. Analytic reconstruction of structure floors involves recognizing feature floors where they were not designated. Structure floors may have been given different feature designations in different squares; these are combined here. Because unstructured aggregates such as stains and debris scatters on floors were only sometimes featured separately, those which were are combined with the floor and not counted separately below. Structured features such as hearths and pits which originate on floors are, however, counted separately. (In this report, FMR scatters are counted separately when they occur on housepit floors because recording of them as separate features was consistent.) The structures and their floors are described individually in the following chapter.

As a group, structure floors have the highest average density of lithic artifacts, the second highest density of non-lithic artifacts, as well as high densities of shell and bone in comparison with other feature types (Table 6-3, Figure 6-1). They have only moderate densities of FMR. House floors are one of the few feature types with which bone and shell artifacts and ocher are associated Table 6-4). Nearly all the types of shaped and worn lithic artifacts are found on house floors (Table 6-5).

EXTERIOR OCCUPATION SURFACE

Exterior occupation surfaces are like house floors in every respect except that they are not bounded by structure walls. The tactical problems of recognition are even greater than for house floors because of the absence of abrupt structural boundaries. They are characterized by dense concentrations of diverse artifacts, although the preservation of some kinds of materials is not as good as in structures. A fairly large exposure of the surface may be necessary to demonstrate the internal structuring. Some exterior occupation surfaces may in fact be floors of surface structures in which the structural remains are not evident. A single example of this type of feature (F9/17)was found at 45-OK-2A. It was exposed in a single unit, and internal structuring was not evident. It was placed in this category rather than called a debris scatter because of the extremely high density of artifacts, particularly the large number of projectile points.

POSTMOLDS

Ten postmold features were recorded at 45-OK-2. They are small, cylindrical or conical pits, relatively deep in comparison to their diameter. Features 22, 56, and 69 are illustrated in Figure 6-2 through 6-4. The sides are generally parallel, although Feature 69 is conical. The fill is either the same as the overlying stratum or contains remnants of the posts in the form of wood charcoal, or a dark stain. Shell, bone, FMR, and lithic debitage occur in low numbers in the fill of these postmolds (Table 6-3 and Figure 6-1) but are not related to the feature function. A single biface and two utilized flakes are the only worn or shaped lithics found in postmolds (Table 6-5).

Postmolds or postholes indicate locations where posts were set in the ground and are thus indications of structures. The post may have been pulled up, leaving a hole, or it may have burned or decomposed in place. All but one of the postmold features was found associated with a house (Table 6-6). It is likely that Feature 46, the single exception, is associated with a house insufficiently exposed for recognition.

Table 6-6. Association of feature types with houses, 45-OK-2 and 45-OK-2A.

Feature Type	45-OK-2		45-OK-2A	
	House Interior	Exterior	House Interior	Exterior
Postmolds	9	1	–	–
Pits	3	3	1	3
Ovens	3	7	–	1
Hearths	4	4	–	–
FMR Clusters	4	9	–	1
FMR Scatters[1]	–	15	–	4
Oxidized Soil[1]	–	5	–	1
Dark Stains[1]	–	4	–	–
Shell Layers[1]	–	18	–	–
Bone Scatters[1]	–	2	–	–
Rock Clusters	1	–	–	–

[1] Unstructured features were not counted as separate features if they occurred on a house floor.

PITS

Six pit features were found at 45-OK-2 and four at 45-OK-2A. Like postmolds, these are constructed subsurface features without evidence of fire, but they are larger and relatively less deep than postmolds. The contents of pit features may or may not relate to the function of the pit. Some pits still contain the materials stored in them, while others were filled with

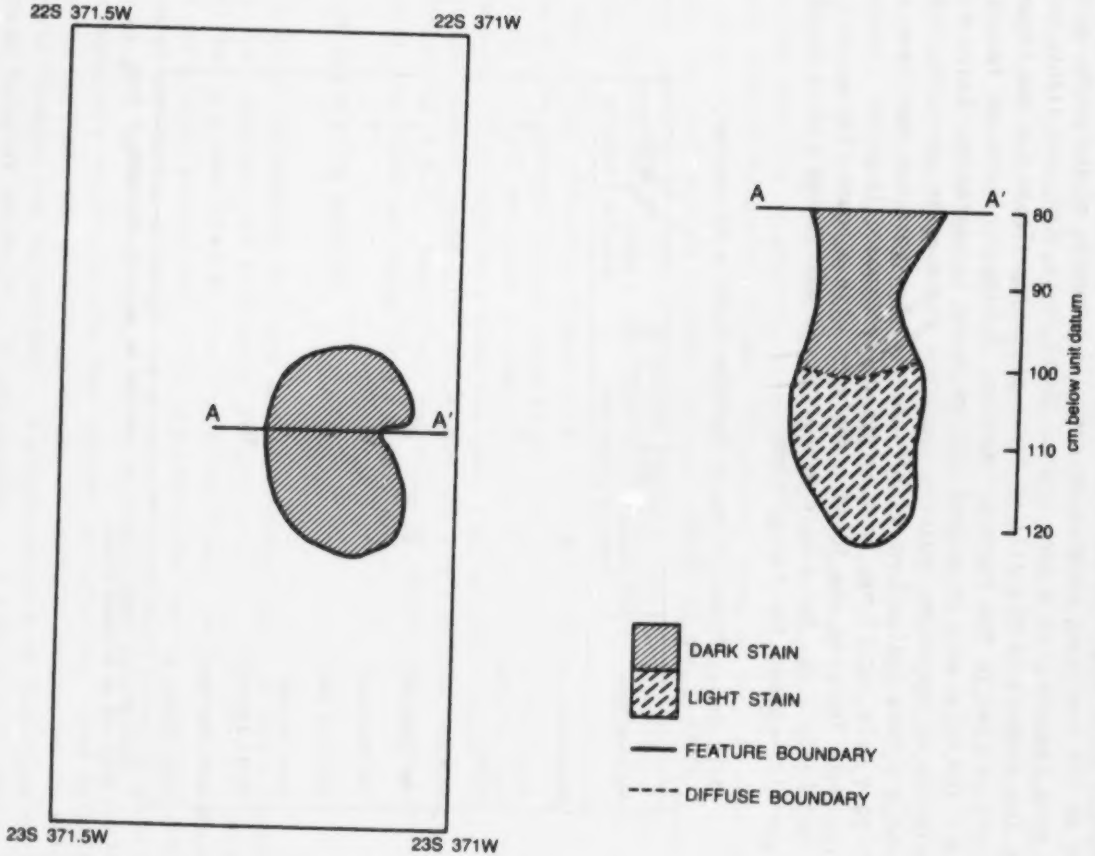

22S 371.5W
22S 371W
23S 371.5W
23S 371W
A
A'
A
A'
80
90
100
110
120
cm below unit datum
DARK STAIN
LIGHT STAIN
FEATURE BOUNDARY
DIFFUSE BOUNDARY

Figure 6-2. Plan and profile views of postmold Feature 22, 45-OK-2.

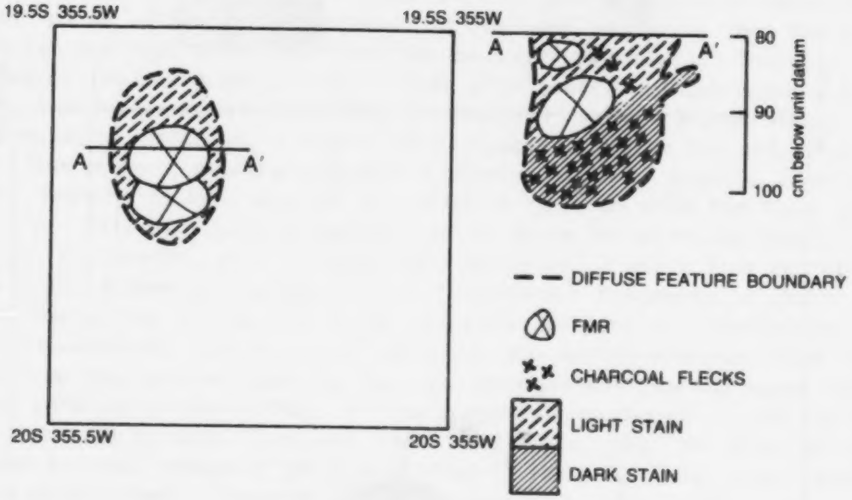

19.5S 355.5W
19.5S 355W
20S 355.5W
20S 355W
A
A'
A
A'
80
90
100
cm below unit datum
DIFFUSE FEATURE BOUNDARY
FMR
CHARCOAL FLECKS
LIGHT STAIN
DARK STAIN

Figure 6-3. Plan and profile views of postmold Feature 56, 45-OK-2.

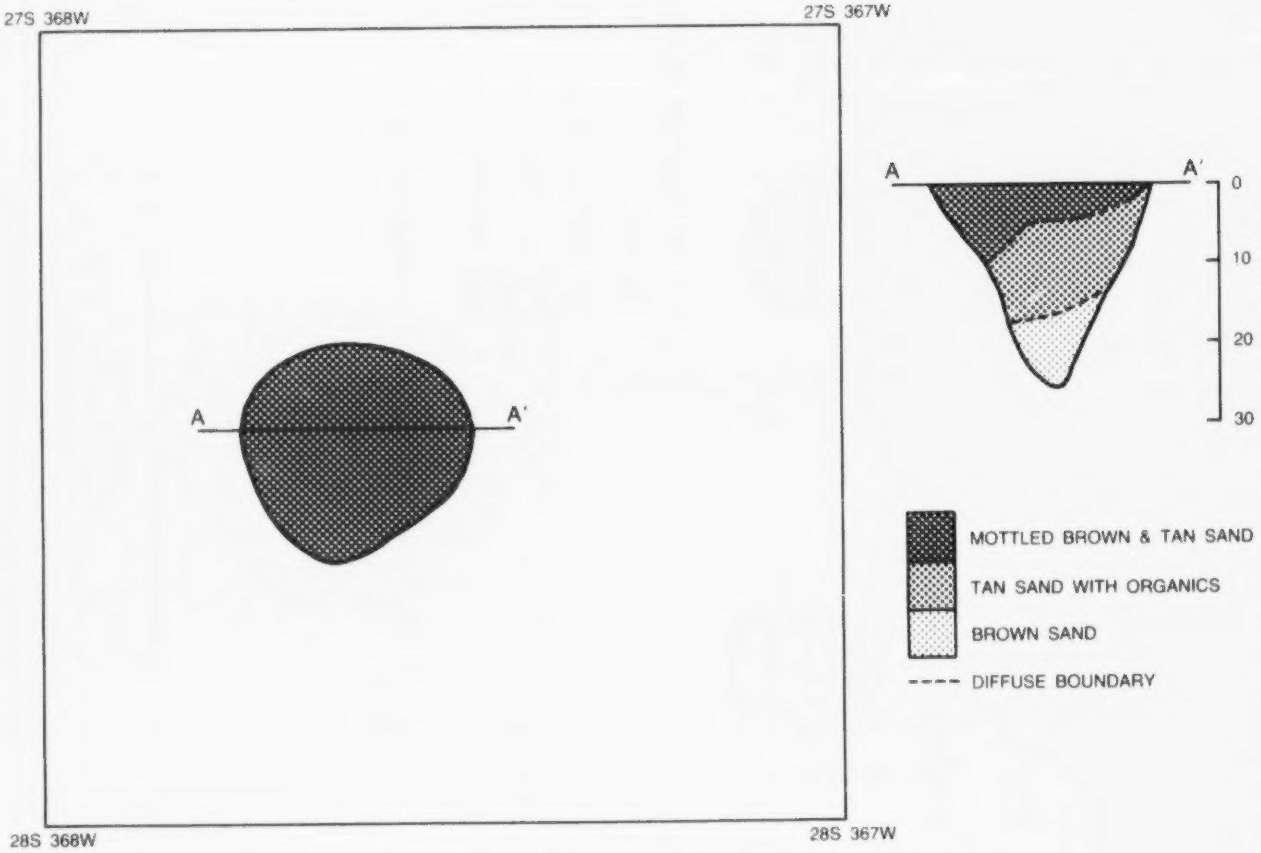

27S 368W
27S 367W
28S 368W
28S 367W
A
A'
A
A'
0
10
20
30
cm below unit datum
MOTTLED BROWN & TAN SAND
TAN SAND WITH ORGANICS
BROWN SAND
DIFFUSE BOUNDARY

Figure 6-4. Plan and profile views of postmold Feature 69, 45-OK-2.

natural sediments or occupational debris after abandonment. Pit features were found inside and outside of houses in equal numbers.

All of the pits are roughly circular in plan view, with regular, abrupt boundaries. They vary in size and contents, but are too few to warrant subdivision. Feature 93 (45-OK-2) was a deep, narrow pit containing tightly packed FMR and unburned bone. The stained fill of Feature 18 (45-OK-2A) contained bones, FMR, and lithics, and a hammerstone and six flat unmodified cobbles were found at the base. Features 41, 60, 123 (Figure 6-5), and 129 (Figure 6-6) at 45-OK-2 and Features 2, 20 (Figure 6-7), and 21 at 45-OK-2A are filled with a dark matrix and the contents are chiefly fish bone.

Botanical remains from two of the latter, Features 2 and 20, 45-OK-2A, were analyzed. Feature 2 is 70 cm deep and possibly one meter in diameter with relatively straight sides and a flat bottom (Figure 2-7). Samples from both the top and the bottom of the feature included pine and bitterbrush charcoal and an unidentified residue. It has been suggested that the pine and bitterbrush are fuel woods and that the co-occurrence of fuel charcoal with fish remains indicates the pit was filled with general midden accumulation. However, the frequency of fish bones in the fill is much higher than in the general midden, indicating a significant association with the pit. Also, the unidentified organic residue suggests a concentration of organic materials in the pit. Feature 20 is a similar pit which originated from the floor of Housepit 8. Only partially excavated, it is 60 cm in depth and possibly over one meter in diameter, with straight to sloping walls and a flat bottom (Figure 2-8). A darkly stained layer with numerous fragments of charcoal was found at the bottom of the pit, above which was mottled fill containing minor amounts of charcoal. Larch, ponderosa pine, and spruce charcoal were found in samples from the bottom layer, as well as incompletely charred aspen wood, and hardwood bark and pithy cortex. It was suggested in Chapter 5, on the basis of the diversity of wood types and their conditions, that the wood derived from general camp refuse which accumulated in the pit. This is not consistent with the stratigraphic evidence that the woods were laid down in a distinct layer, and then buried relatively rapidly by fill. It is not necessary at this time to reconcile the interpretations based on botanical remains with those based on feature structure and 1/8-inch screen contents. Because we know so little about botanical remains from pit features, each of these cases is unique and we do not know what weight to give to the different lines of evidence.

The contents of Feature 100--a human cranium--are unique among the features at 45-OK-2. A small circular pit, this feature originates from the Housepit 3 floor. At the base of the pit was a human cranium lacking a mandible, lying on its right side and facing the river. Small pebbles lay under the right mastoid process. The base of the pit was filled with a dark, soft matrix which may have come from a rodent hole intersected by the pit. The remainder of the pit was filled with a lighter matrix resembling the material in which the housepit was excavated, although slightly darker. Three pieces of ocher and a flaked long bone were found with the cranium, as well as two unmodified bones and six FMR. Given the small size of the pit, the three pieces of ocher represent a considerable concentration of this material. A

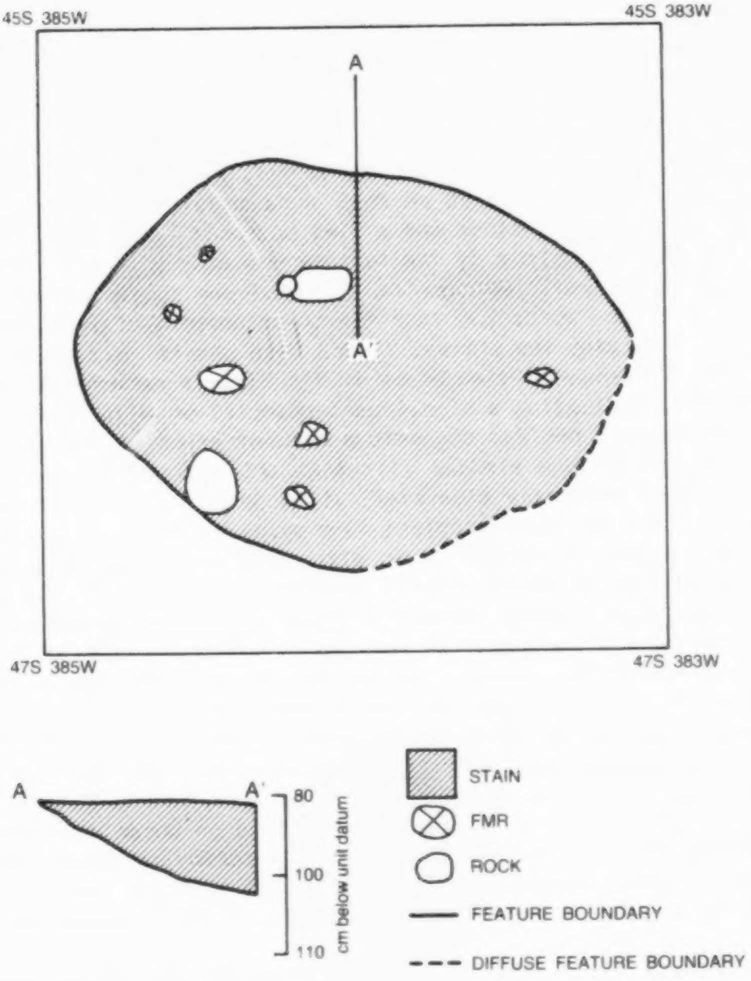

45S 385W
45S 383W
A
A'
47S 385W
47S 383W
A
A'
80
100
110
cm below unit datum
STAIN
FMR
ROCK
FEATURE BOUNDARY
DIFFUSE FEATURE BOUNDARY

Figure 6-5. Plan and profile views of pit Features 123, 45-OK-2 (profile drawn after feature partially excavated).

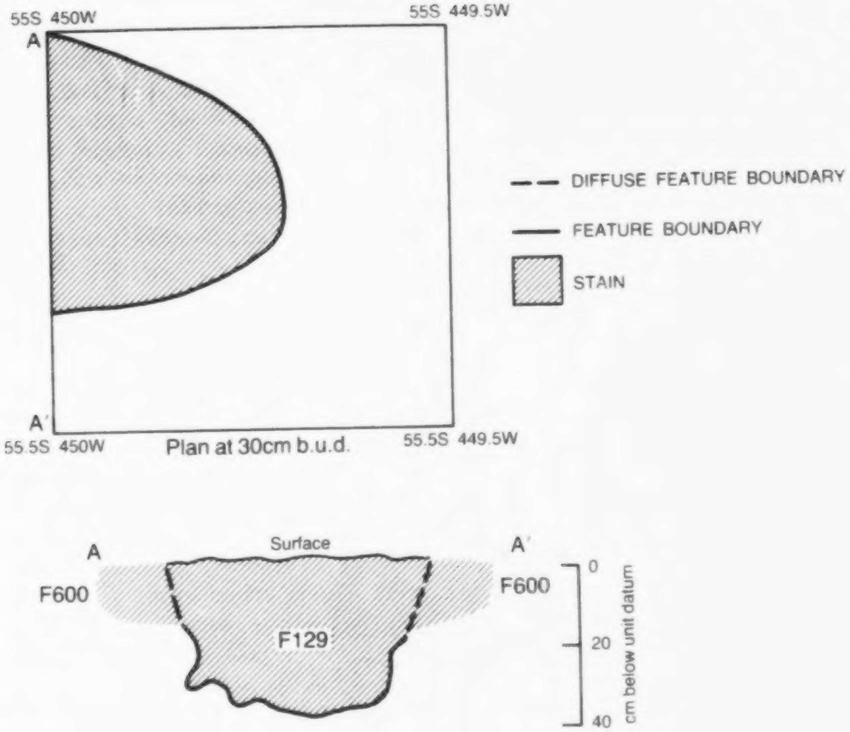

55S 450W
55S 449.5W
A
A′
55.5S 450W
Plan at 30cm b.u.d.
55.5S 449.5W
DIFFUSE FEATURE BOUNDARY
FEATURE BOUNDARY
STAIN
A
Surface
A′
F600
F129
F600
0
20
40
cm below unit datum

Figure 6-6. Plan and profile views of pit Feature 129, 45-OK-2.

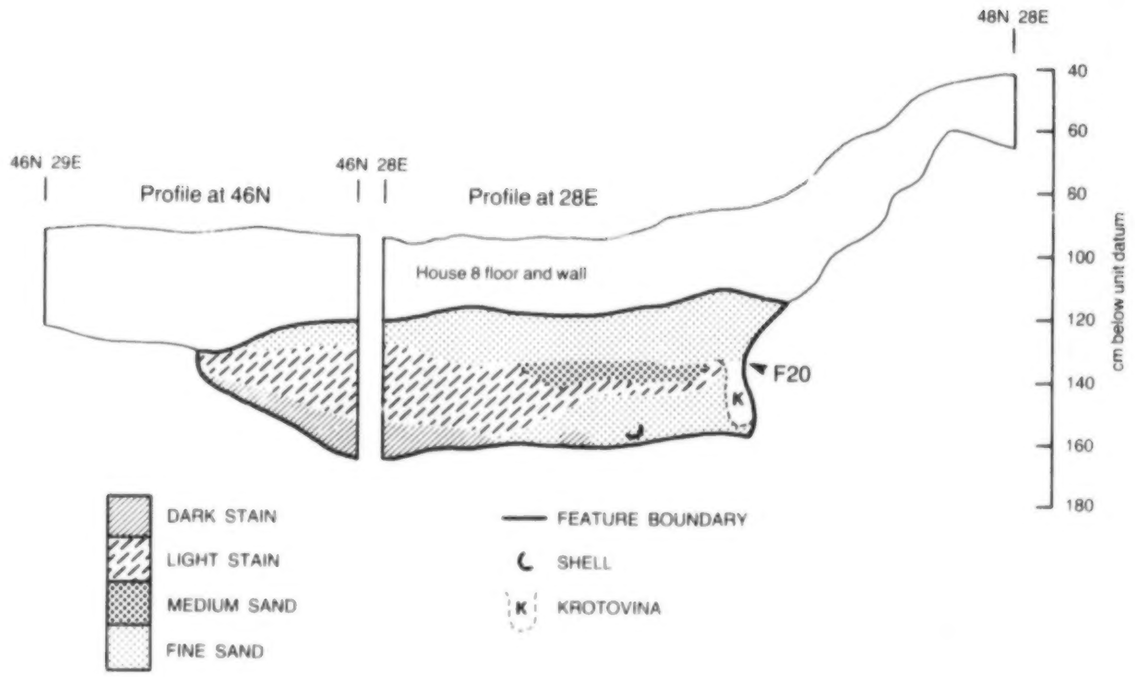

46N 29E
Profile at 46N
46N 28E
Profile at 28E
48N 28E
House 8 floor and wall
F20
K
40
60
80
100
120
140
160
180
cm below unit datum
DARK STAIN
LIGHT STAIN
MEDIUM SAND
FINE SAND
FEATURE BOUNDARY
SHELL
K
KROTOVINA

Figure 6-7. Profile view of pit Feature 20, 45-OK-2A.

flotation sample from this feature yielded small amounts of ponderosa pine, yellow pine, and Douglas fir charcoal, as well as bark and other unidentified wood fragments. These items may be miscellaneous charcoal refuse accidentally introduced into the pit in the fill.

In comparison with other feature types, pits have low densities of FMR, lithic artifacts, and shell (Table 6-3 and Figure 6-1). Owing to the large proportion of fish bone, typically small in size, the density of bone is considerably higher when measured by count than when measured by weight. Pits are one of the few feature types from which nonlithic actifacts were recovered: a single piece of ocher was recovered from Feature 60, three pieces of ocher and a flaked long bone from Feature 100, and a shell disc bead from Feature 123 (Table 6-4). The single shaped or worn lithic artifact found in a pit feature is a hammerstone (Table 6-5). Pits were found both within and outside of houses. Except in the case of Feature 100, there is no evidence for any function other than storage. The fact that some of the pits with fish bone are located inside houses seems consistent with use of the pits to store prepared fish, rather than use of the pits in processing fish or disposing of refuse.

OVENS

Ten features at 45-OK-2 and one at 45-OK-2A are constructed pits with evidence of burning. The pit fill is generally stratified, including layers of burnt and unburnt soil, wood charcoal and other carbonized organic materials, ash, and FMR. We interpret these features as ovens, that is, pits used to cook food or heat other materials with trapped heat. The method of cooking food by placing it in a pit with a heat source and filling the pit with heat-retaining materials is well documented ethnographically in the project area. Earth ovens constructed with layers of different materials were used to cook vegetable foods and meat (Ray 1932:106; Post 1938:27). Because such ovens would have had to have been at least partially dismantled to retrieve the food, their archaeological recognition may be difficult. While oxidized soil or other evidence of burning remaining at the base and margins would distinguish ovens from other pits, it may be difficult to determine how the oven was prepared and what food was being cooked. Although they share many traits with open hearths, ovens--constructed to retain rather than radiate heat--should be relatively deeper. Ovens were found inside houses, but more commonly outside (Table 6-6).

Selected features are illustrated to demonstrate the stratified pit fill and evidence of burning which characterize features assigned to the oven category. Feature 8 (Figure 6-8) contains separate layers of ash, burnt soil, and charcoal staining. The FMR occurred at the top and a layer of pine needles or matting was found at its bottom. Feature 11 is either the lowest stratum of the Feature 8 pit, or a leaching ring below it. Similar layers are apparent in Features 50 (Figure 6-9), 71 and 74 (Figure 6-10 and 6-11), and 79 (Figure 6-12).

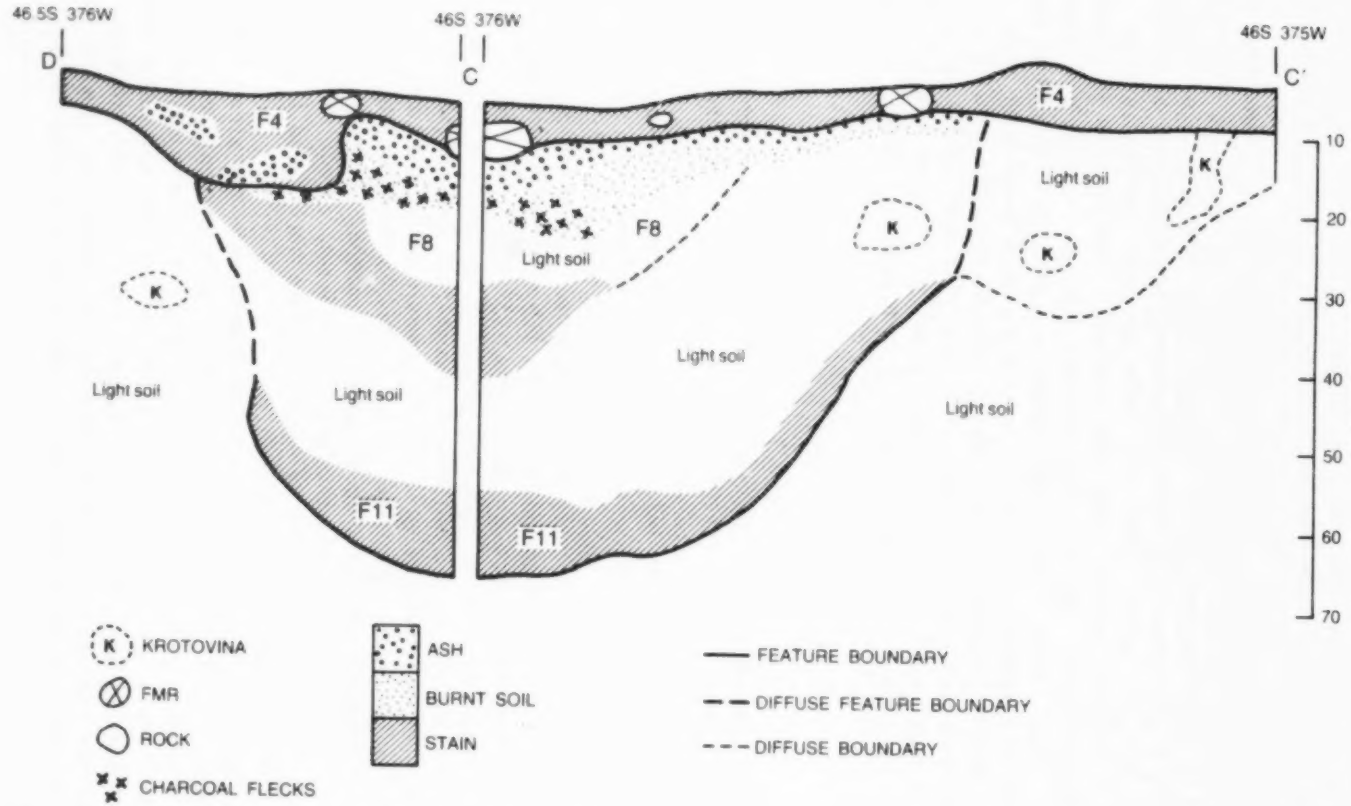

46.5S 376W
D
46S 376W
C
46S 375W
C'
F4
F4
F8
F8
F11
F11
Light soil
Light soil
Light soil
Light soil
Light soil
Light soil
K
K
K
K
10
20
30
40
50
60
70
cm below unit datum
KROTOVINA
FMR
ROCK
CHARCOAL FLECKS
ASH
BURNT SOIL
STAIN
FEATURE BOUNDARY
DIFFUSE FEATURE BOUNDARY
DIFFUSE BOUNDARY

Figure 6-8. Profile view of oven Feature 8/11, 45-OK-2. For plan view, see Figure 6-10.

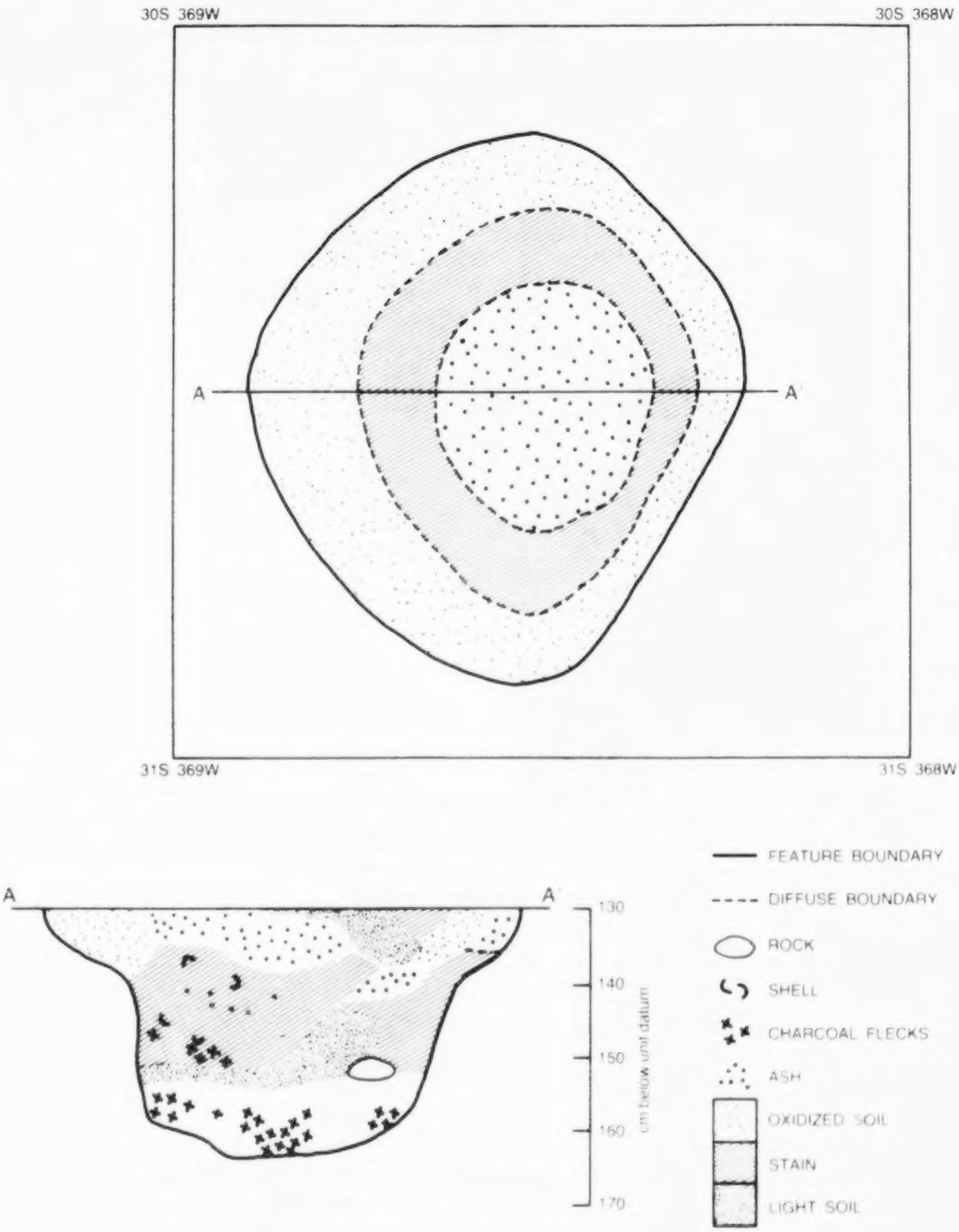

30S 369W
30S 368W
A
A'
31S 369W
31S 368W
A
A'
130
140
150
160
170
cm below unit datum
FEATURE BOUNDARY
DIFFUSE BOUNDARY
ROCK
SHELL
CHARCOAL FLECKS
ASH
OXIDIZED SOIL
STAIN
LIGHT SOIL

Figure 6-9. Plan and profile views of oven Feature 50, 45-OK-2.

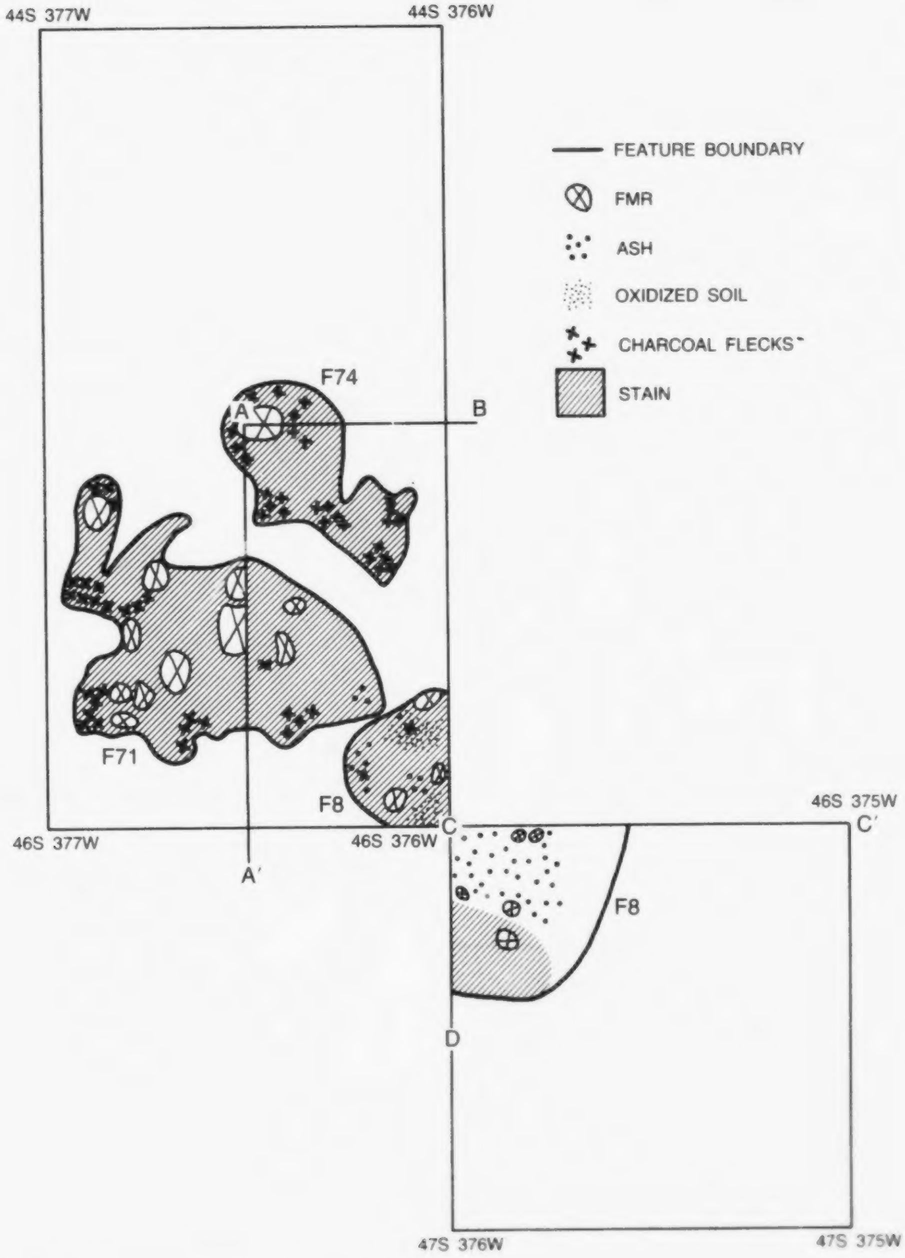

44S 377W
44S 376W
FEATURE BOUNDARY
FMR
ASH
OXIDIZED SOIL
CHARCOAL FLECKS
STAIN
F74
A
B
F71
F8
46S 377W
46S 376W
A'
C
46S 375W
C'
F8
D
47S 376W
47S 375W

Figure 6-10. Plan views of oven Features 8, 71 and 74, 45-OK-2.

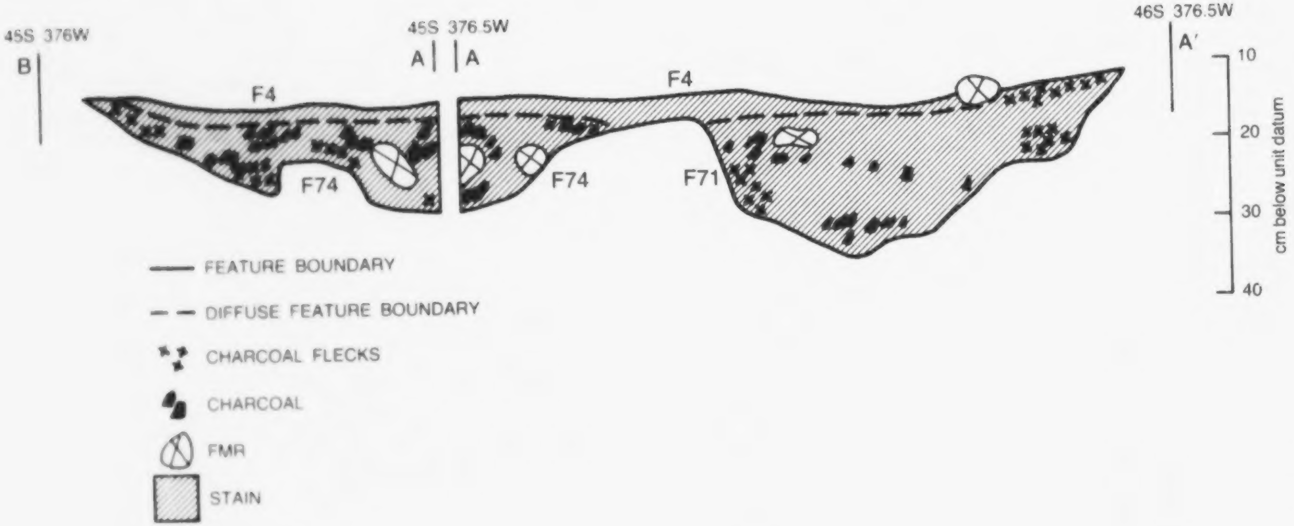

45S 376W
B
45S 376.5W
A
A
46S 376.5W
A′
F4
F74
F4
F74
F71
10
20
30
40
cm below unit datum
FEATURE BOUNDARY
DIFFUSE FEATURE BOUNDARY
CHARCOAL FLECKS
CHARCOAL
FMR
STAIN

Figure 6-11. Profile of oven features 71 and 74, 45-OK-2.

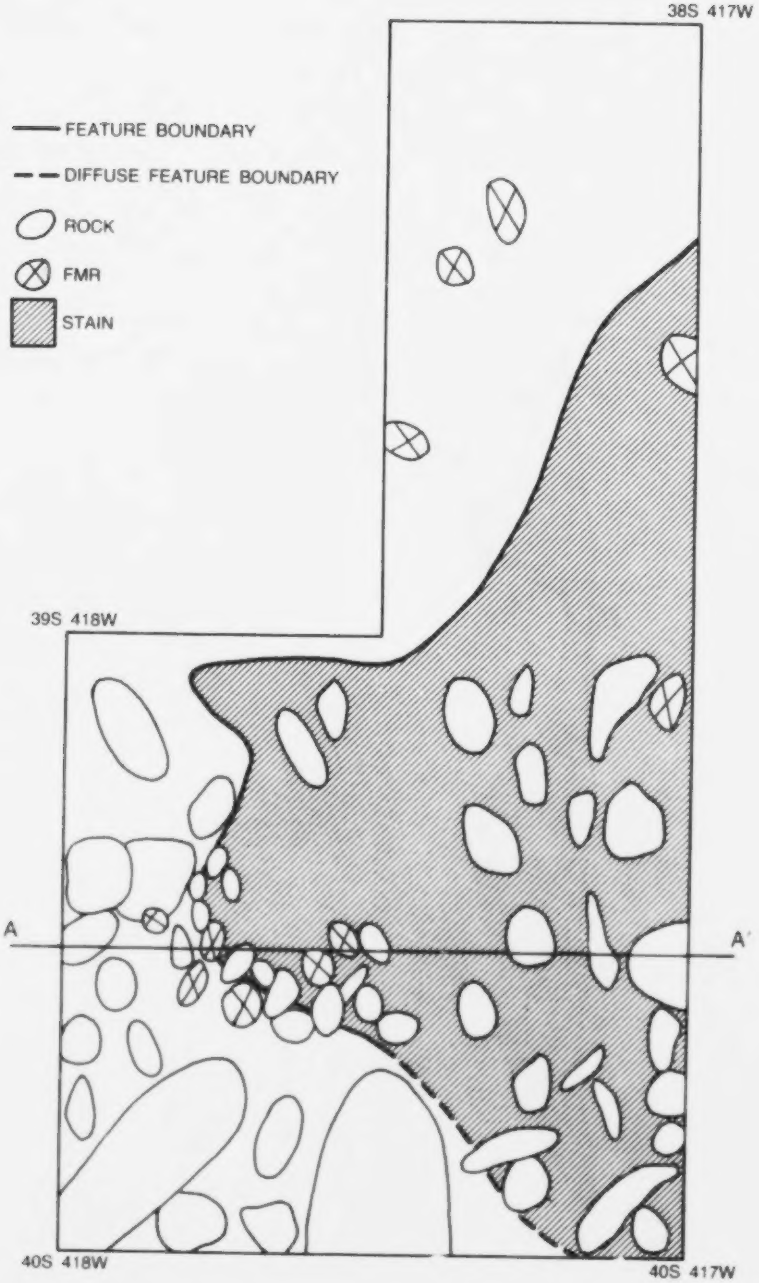

38S 417W
FEATURE BOUNDARY
DIFFUSE FEATURE BOUNDARY
ROCK
FMR
STAIN
39S 418W
A
A'
40S 418W
40S 417W

Figure 6-12. Plan and profile views of oven Feature 79, 45-OK-2.

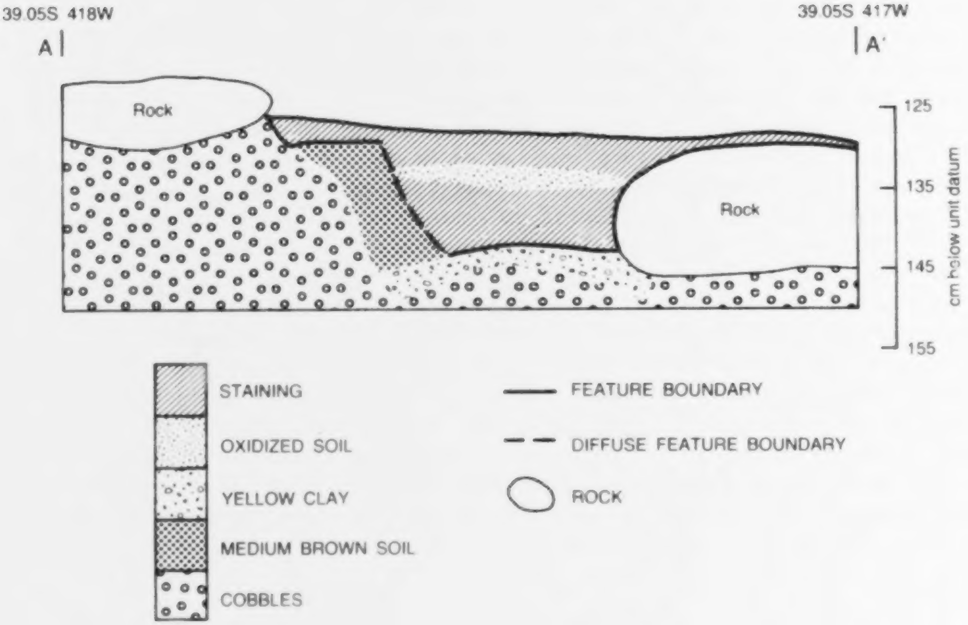

39.05S 418W
A
39.05S 417W
A'
Rock
Rock
125
135
145
155
cm below unit datum
STAINING
OXIDIZED SOIL
YELLOW CLAY
MEDIUM BROWN SOIL
COBBLES
FEATURE BOUNDARY
DIFFUSE FEATURE BOUNDARY
ROCK

Figure 6-12. Cont'd.

Features 78 and 86 (Figure 6-13 and 6-14) are pits filled with stacked shell. Evidence of a fire in the pit consists of a dark stained layer and charcoal at the base of Feature 86 and an oxidized soil layer at the base of Feature 78. We cannot be certain whether these pits were actually used for steaming shellfish. If so, either the food was never collected from the pit, or the shells were tossed back in after the edible parts were consumed. The shell is not burned, but we would not expect it to be burned in the normal cooking process. Feature 78 is much smaller than the other pits, but a small pit would be quite adequate for steaming shellfish.

Feature 5, 45-OK-2A (Figure 6-15) is a small pit, 40 cm x 34 cm in plan view and 32 cm deep, with slightly sloping sides and a rounded bottom. Evidence of fire in the pit includes reddening or oxidation of the upper walls and a tight cluster of FMR at the top of the feature. The pit was lined with what appeared in the field to be woven materials. Botanical remains from this feature were examined. The lining noted in the field was found to be ponderosa pine in branch form complete with bark, twigs, and needles. Larch branch material was present as well. Root material and a crushed serviceberry seed may be the remains of a dried preparation made for winter use. The botanical remains support an interpretation of Feature 5 as a storage pit, while the structural evidence indicates it was used as an oven. At least two different explanations can be presented to reconcile the conflicting evidence. The walls of storage pits may have been deliberately fire-hardened prior to use, to aid in preservation and discourage rodents. In this case, the FMR cluster may have been part of the covering of the pit to keep it sealed. Alternatively, the upper portion of the pit could have been burned accidentally by a fire above the pit, or a shallow fire placed in the top of the pit.

Relative to other feature types, the features in this category have high concentrations of FMR and lithic debitage, and low concentrations of everything else (Table 6-3 and Figure 6-1). Two types of shaped or worn lithics--projectile points and utilized flakes--were found in association with ovens (Table 6-5). The relative proportions of rock types comprising the FMR are similar to those in other feature types (Table 6-7).

Table 6-7. Material of FMR in selected feature types, 45-OK-2.

Feature Type	N	Statistic	Quartzite %	Basalt %	Granite %	Other %
Ovens	10	N	11	41	430	31
		%	2.1	8.0	83.8	6.1
Hearths	8	N	16	18	255	2
		%	5.5	6.2	87.6	0.7
FMR Scatters	15	N	84	170	1289	12
		%	5.4	10.9	82.9	0.8
FMR Clusters	12	N	2	37	244	2
		%	0.7	13.0	85.6	0.7

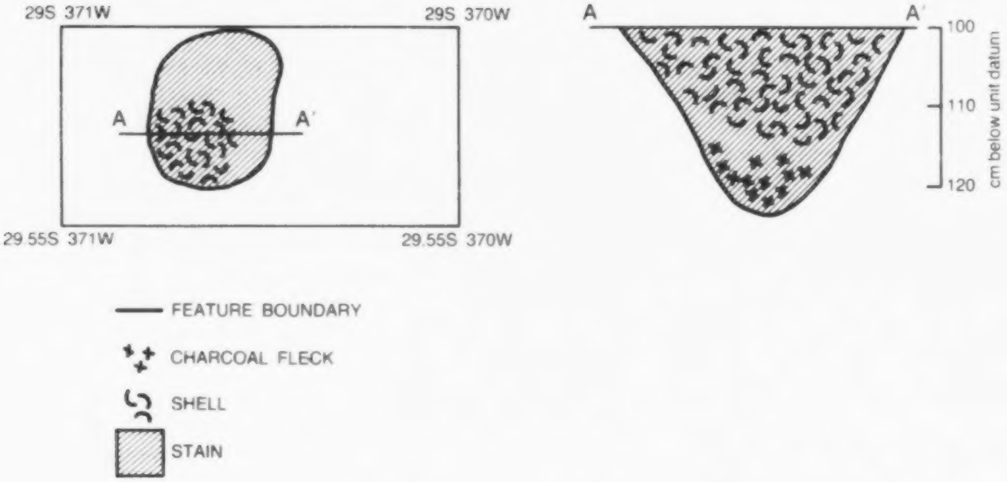

29S 371W
29S 370W
A
A′
29.55S 371W
29.55S 370W
A
A′
100
110
120
cm below unit datum
FEATURE BOUNDARY
CHARCOAL FLECK
SHELL
STAIN

Figure 6-13. Plan and profile views of oven Feature 78, 45-OK-2.

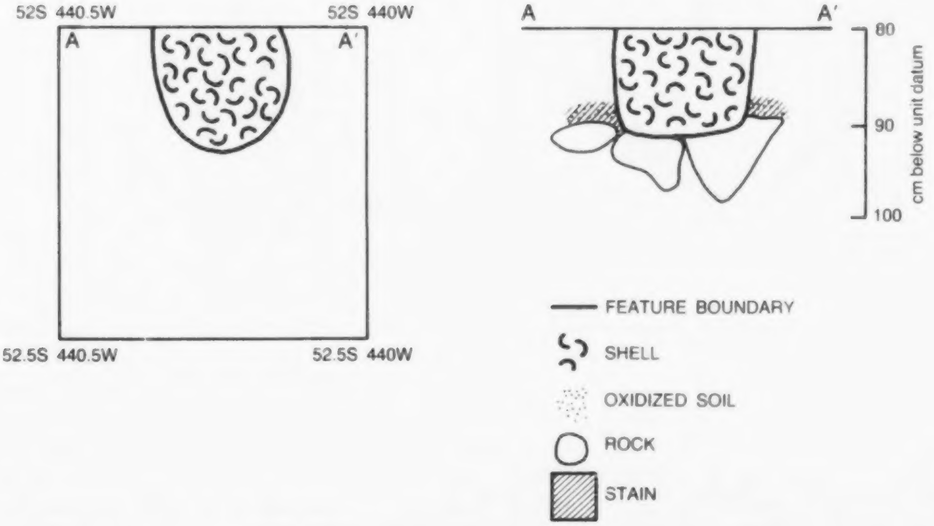

52S 440.5W
52S 440W
A
A′
52.5S 440.5W
52.5S 440W
A
A′
80
90
100
cm below unit datum
FEATURE BOUNDARY
SHELL
OXIDIZED SOIL
ROCK
STAIN

Figure 6-14. Plan and profile views of oven Feature 86, 45-OK-2.

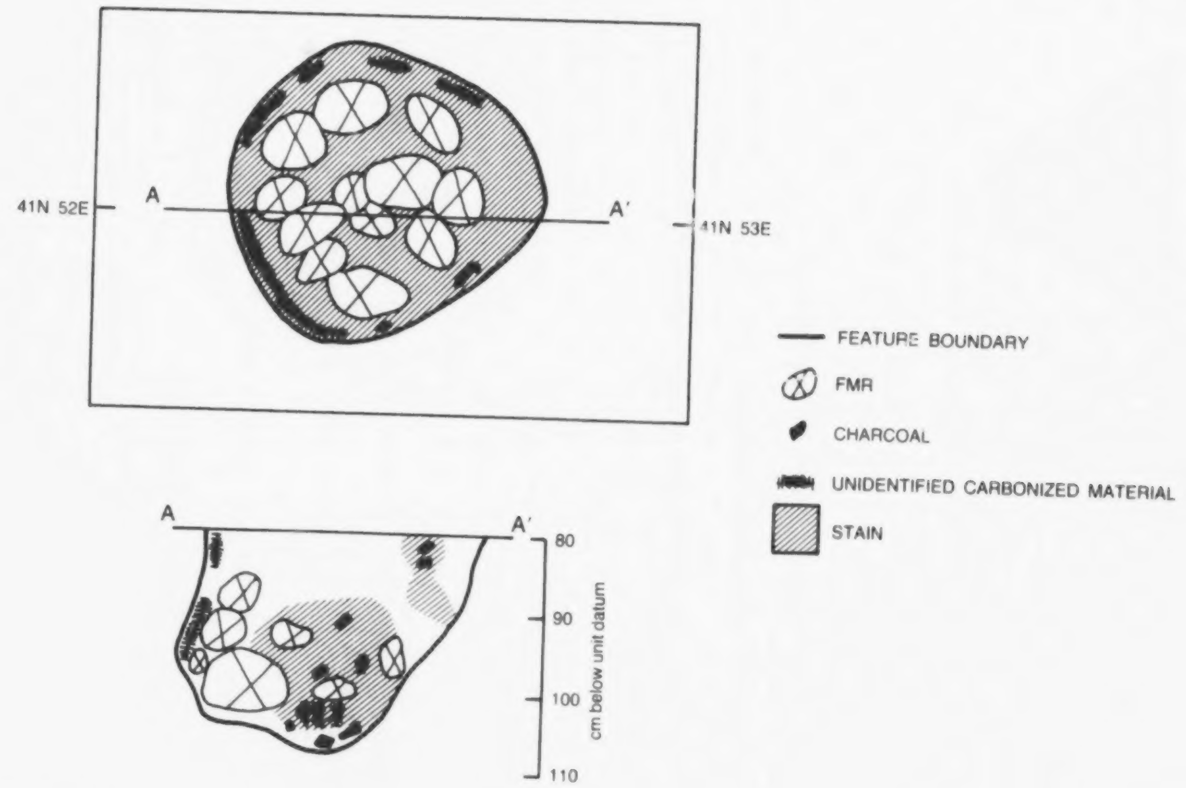

41N 52E
A
A′
41N 53E
A
A′
80
90
100
110
cm below unit datum
FEATURE BOUNDARY
FMR
CHARCOAL
UNIDENTIFIED CARBONIZED MATERIAL
STAIN

Figure 6-15. Plan and profile views of oven Feature 5, 45-OK-2A.

HEARTHS

Nine features at 45-OK-2 are structured features with evidence of burning. All are surface features except Feature 114, which is set in a small depression which probably was excavated. They consist of tightly clustered oval to circular piles of FMR associated with an oxidized or a charcoal-stained matrix and ash. Because the FMR are arranged or clustered, and segregated from the ash and charcoal, the contents are considered structured. Hearths were found inside and outside of houses in equal numbers (Table 6-6). Features 97 and 114 are illustrated in Figures 6-16 and 6-17.

In comparison with other feature groups, hearths have the highest quantities of FMR as measured by weight, and the second highest as measured by count (Table 6-3 and Figure 6-1). The relative proportions of rock types comprising the FMR are similar to those of other feature types with large amounts of FMR (Table 6-7). Densities of other materials are low. Single examples of a bifacially retouched flake and an amorphously flaked cobble are the only shaped and worn lithics found in hearths (Table 6-5).

We have chosen the term hearths as a label for these features which we interpret as the remains of open, constructed fireplaces which were not dismantled after use. Hearths were used ethnographically in the project area to heat structures; to heat rocks for cooking and for sweat lodges; and to dry and smoke foods.

Botanical remains from Feature 97 (Figure 6-16), located on the Housepit 3 floor, were examined. The woods found, in order of abundance, were lodgepole pine, juniper, willow, and red cedar.

FMR CLUSTERS

Thirteen features at 45-OK-2 and one at 45-OK-2A are oval or circular piles of densely packed FMR with no evidence of burning. Minor amounts of charcoal flecking, ash, or oxidized soil may be present, but no more than might have been transported on the rocks themselves. The matrix under and between the rocks is virtually the same as the surrounding area, and there is no concentrated area of oxidation or charcoal indicating in situ burning. FMR clusters were found inside houses, but more commonly outside (Table 6-6).

Features 63, 113, 120, 132, and 134 are illustrated in Figures 6-18 through 6-21. Feature 106 is a composite feature: one portion is a cluster of FMR with no stain, while the other portion is an FMR scatter with a stain. Feature 120 is located adjacent to an FMR scatter Feature 119 (Figure 6-20). Feature 85 is located adjacent to an unfeatured orange stain, and Feature 31 is associated with a shell concentration. Feature 13 (45-OK-2A) is associated with Feature 12, an FMR scatter.

In comparison with other features, this group has high densities of FMR and moderate densities of shell hinges (Table 6-3 and Figure 6-1). Other contents occur only in low densities. Small numbers of projectile points, tabular knives, and hammerstones were found in FMR clusters (Table 6-5). The functional interpretation of FMR clusters is uncertain. Often found in association with FMR scatters and with hearths, they may represent piles of

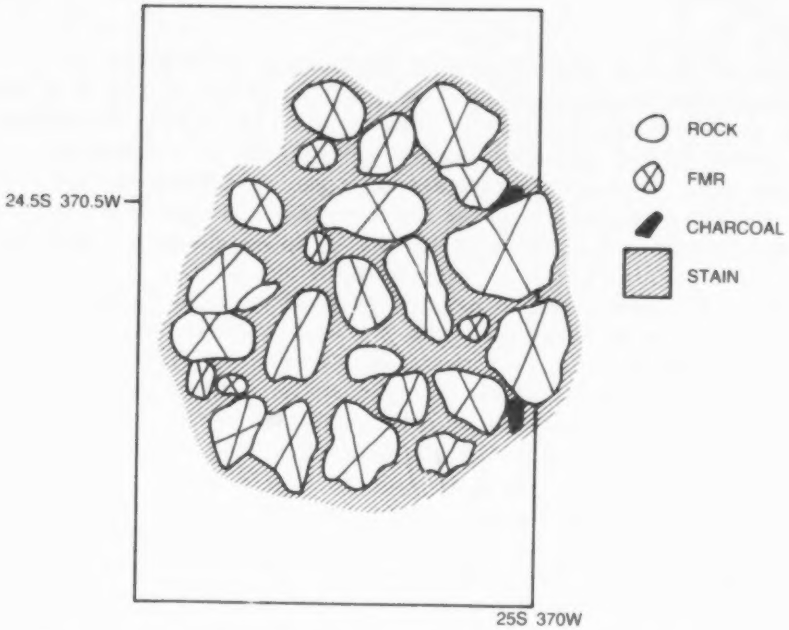

24.5S 370.5W
25S 370W
ROCK
FMR
CHARCOAL
STAIN

Figure 6-16. Plan views of hearth Feature 97, 45-OK-2.

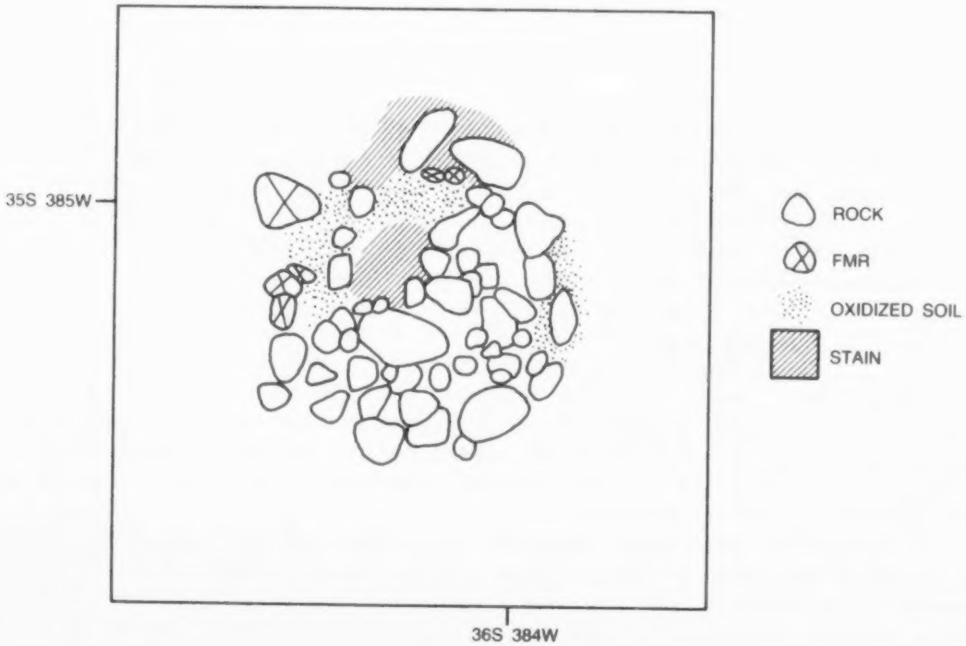

35S 385W
36S 384W
ROCK
FMR
OXIDIZED SOIL
STAIN

Figure 6-17. Plan views of hearth Feature 114, 45-OK-2.

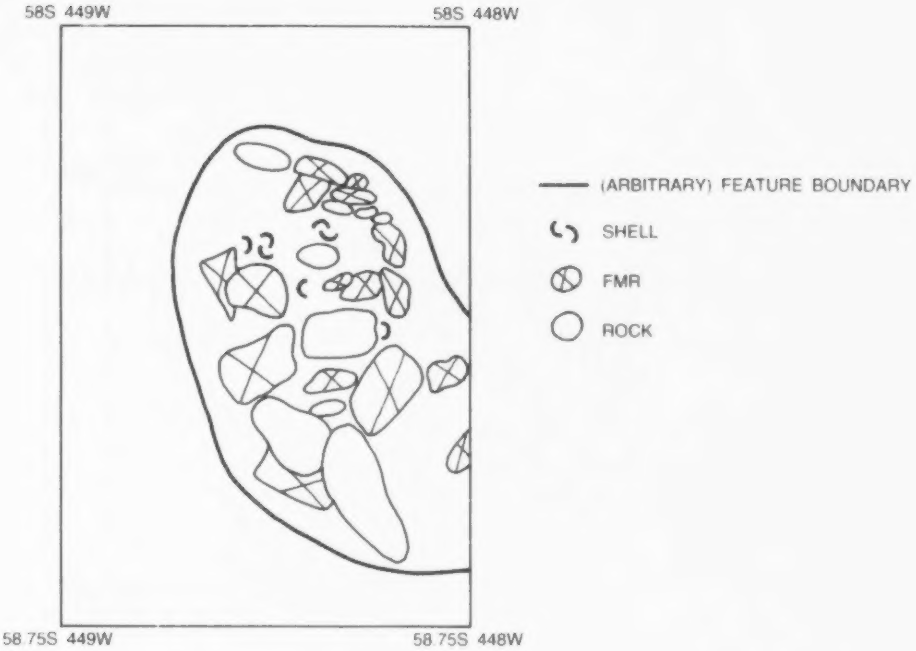

58S 449W
58S 448W
(ARBITRARY) FEATURE BOUNDARY
SHELL
FMR
ROCK
58.75S 449W
58.75S 448W

Figure 6-18. Plan view of FMR cluster Feature 63, 45-OK-2. Boundary does not indicate a soil matrix change.

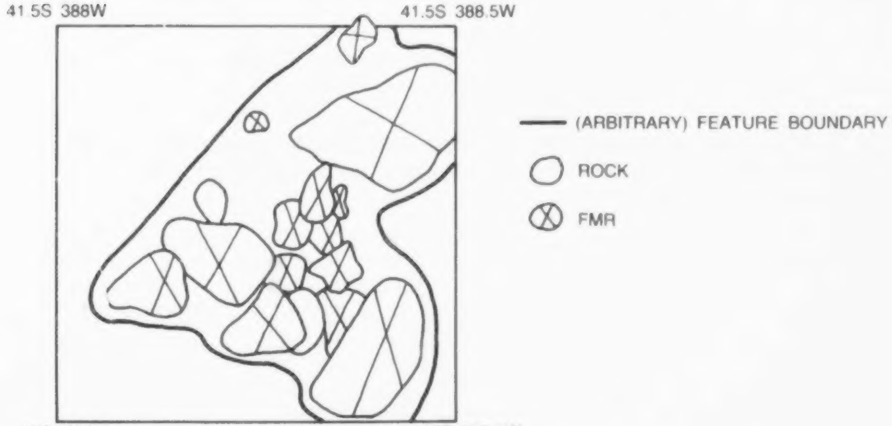

41.5S 388W
41.5S 388.5W
(ARBITRARY) FEATURE BOUNDARY
ROCK
FMR
42S 388W
42S 388.5W

Figure 6-19. Plan view of FMR cluster Feature 113, 45-OK-2. Boundary does not indicate a soil matrix change.

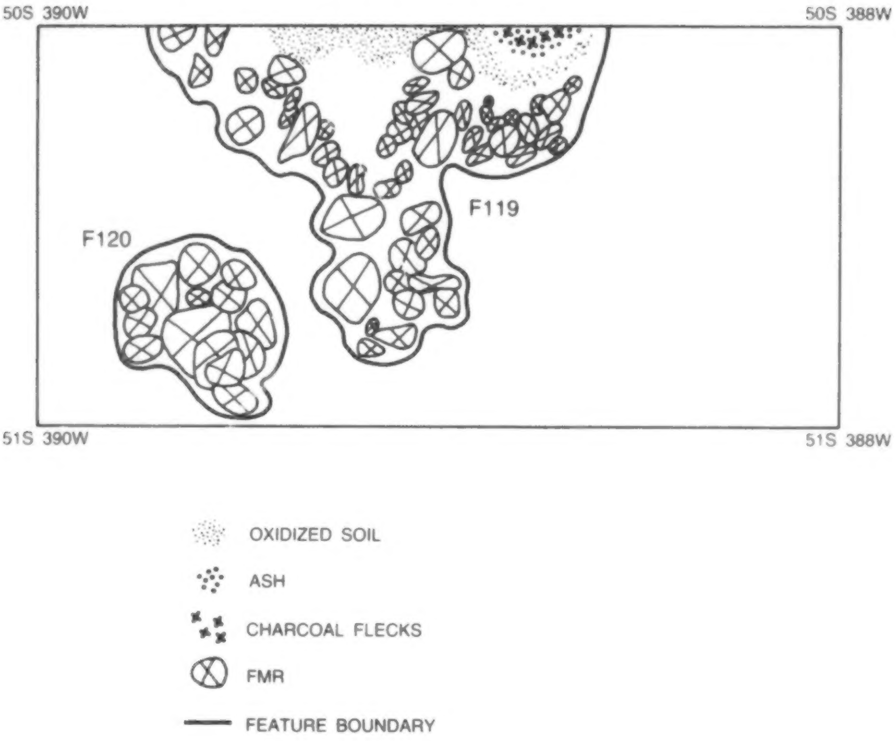

50S 390W
50S 388W
F119
F120
51S 390W
51S 388W
OXIDIZED SOIL
ASH
CHARCOAL FLECKS
FMR
FEATURE BOUNDARY

Figure 6-20. Plan views of FMR cluster Feature 120 and FMR scatter Feature 119, 45-OK-2. Boundary does not indicate a soil matrix change.

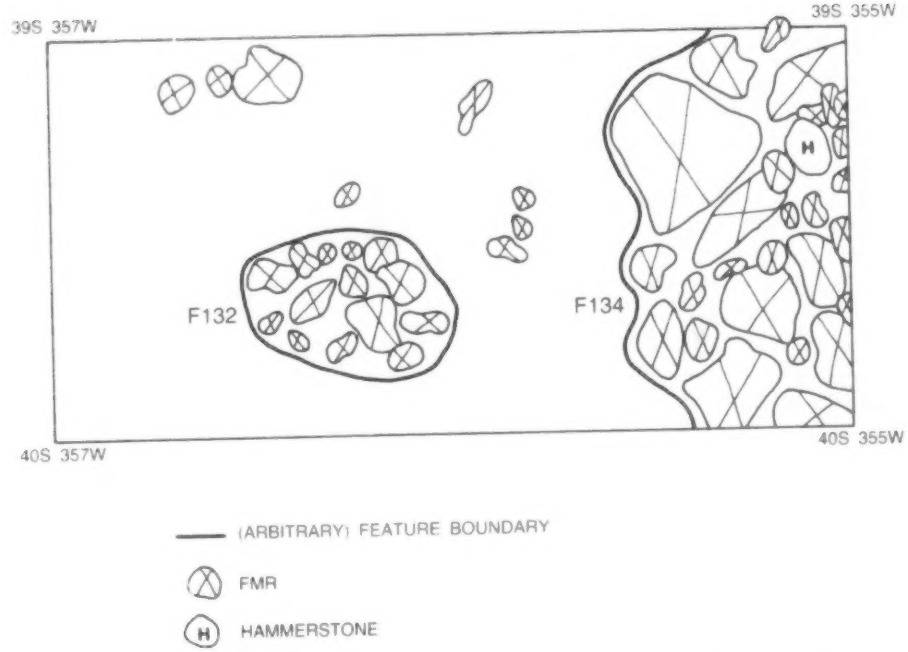

39S 357W
39S 355W
F132
F134
40S 357W
40S 355W
(ARBITRARY) FEATURE BOUNDARY
FMR
H
HAMMERSTONE

Figure 6-21. Plan views of FMR cluster Features 132 and 134, 45-OK-2. Boundary does not indicate a soil matrix change.

FMR removed from a hearth, and stockpiled for reuse. The proportion of material types of FMR in the clusters does not differ significantly from those in other fire-related features (Table 6-7).

FMR SCATTERS

Fifteen features at 45-OK-2 and four at 45-OK-2A are characterized by large numbers of FMR, scattered on a surface in an irregular pattern with diffuse boundaries. Diffuse charcoal staining and oxidized soil may be associated. Only exterior FMR scatters are included here; similar phenomena occur on house floors but are treated as part of the floor. Features 119, 17 and 126 are illustrated in Figures 6-20, 6-22 and 6-23.

In Features 17, 53, 119 and 126 the FMR is scattered adjacent to an area of ash. Feature 12 (45-OK-2A) contains a cluster of FMR (Feature 13). In comparison with the other features, this group has the highest average density of FMR by count, and second highest by weight (Table 6-3 and Figure 6-1). The relative proportions of rock types comprising the FMR are similar to those in other feature types (Table 6-7). Lithic artifacts occur in moderate amounts; other contents are negligible. The types of associated worn and shaped lithics are diverse (Table 6-5).

The FMR scatters include at least two functionally different types of features--those directly associated with burning and those which are not. FMR scatters occurring on top of orange stains or to the side of an ashy area probably represent the remains of a fire in that location which was subsequently spread. In other words, they are dismantled hearths. In other cases, however, the FMR has been scattered or dumped well away from the previous site of the fire and only a diffuse charcoal stain is associated with them.

OXIDIZED SOIL

Features in this group are unstructured surface features consisting of soil which is redder than the surrounding matrix, indicating that it has been oxidized--probably as a consequence of burning. Oxidized soil was common at the two sites in association with housepit floors, hearths, ovens, and FMR scatters, but the five features from 45-OK-2 and one from 45-OK-2A placed in this group are cases of isolated oxidized soil. They are roughly circular or oval in shape, with the exception of Feature 28, and have irregular, diffuse boundaries. Patches of ash were noted in Feature 89, and patches of charcoal staining in Features 14, 24, and 62. Only small quantities of cultural materials--FMR, and both burnt and unburnt lithics, bones, and shell--were associated with the oxidized soil (Table 6-3 and Figure 6-1). However, the feature contents, including the few worn or shaped flake tools (Table 6-5) are not necessarily relevant to the feature function. It is generally the soil **beneath** a fire which is oxidized, thus the alteration of the soil is postdepositional and the "feature" consists only of the soil alteration and not the contents of the soil.

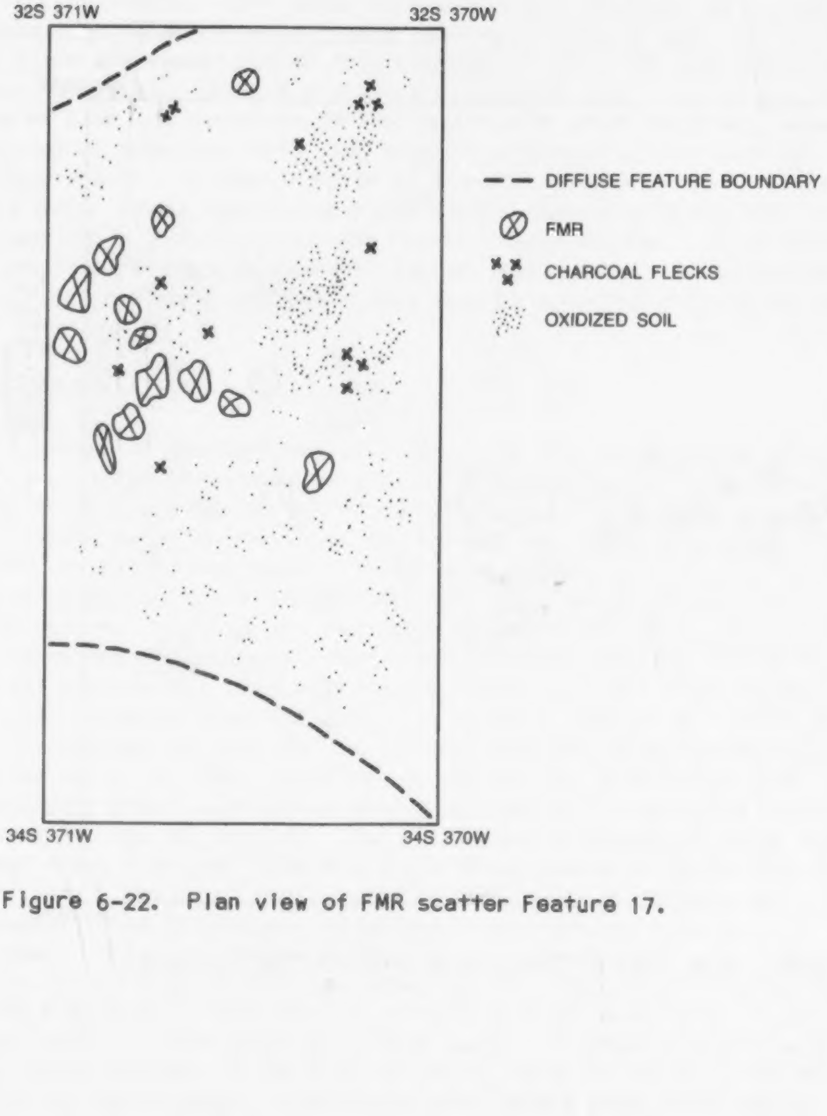

32S 371W
32S 370W
34S 371W
34S 370W
DIFFUSE FEATURE BOUNDARY
FMR
CHARCOAL FLECKS
OXIDIZED SOIL

Figure 6-22. Plan view of FMR scatter Feature 17.

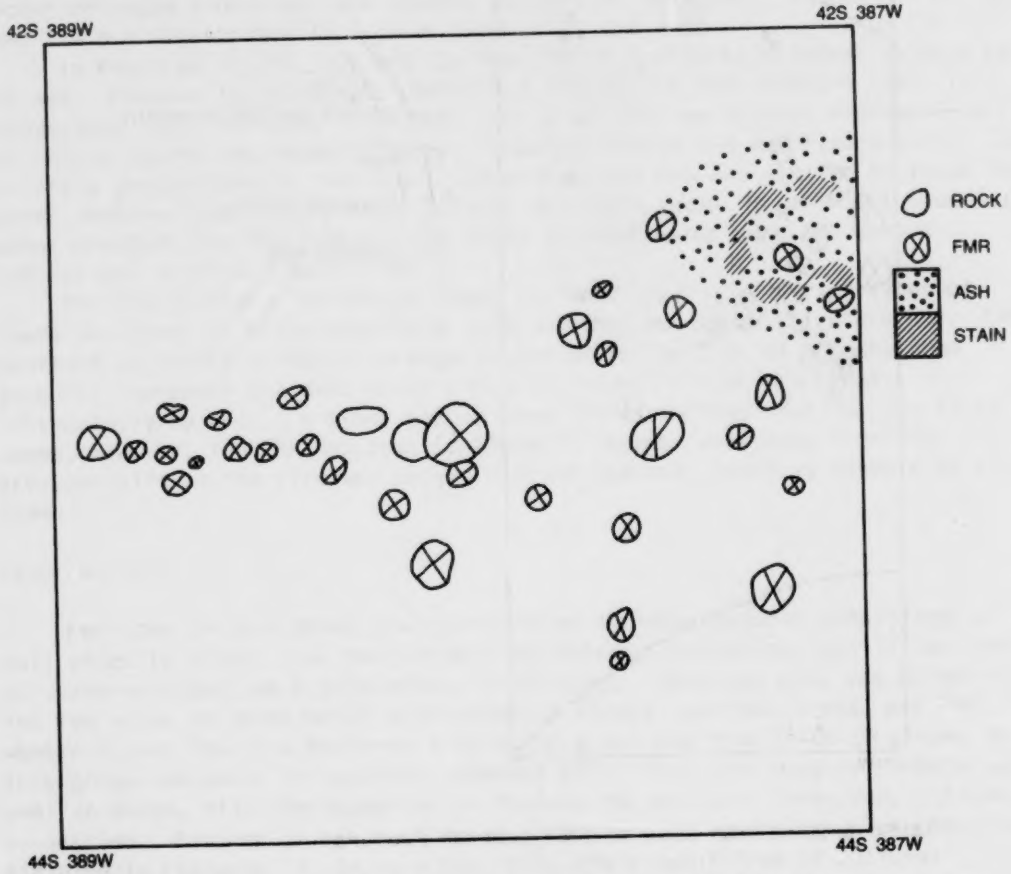

42S 389W
42S 387W
ROCK
FMR
ASH
STAIN
44S 389W
44S 387W

Figure 6-23. Plan view of FMR scatter Feature 126, 45-OK-2.

These features probably indicate the location of either totally dismantled hearths or of fires in which rocks were not employed.

DARK STAINS

Three dark stain features were found at 45-OK-2. They are irregular, unstructured surface features characterized by being darker than the surrounding matrix. Only exterior features are included here; similar phenomena do occur on house floors but are treated as part of the floor. The dark color may result either from charcoal or from the decomposition of organic material. Feature 61 may be a housepit rim. As a group, these features have low densities of FMR relative to other features, moderate densities of bone and shell, and high densities of lithic debitage (Table 6-3 and Figure 6-1). A tabular knife is the only shaped or worn lithic associated (Table 6-5). These features may all have different origins; not enough information is available for functional interpretation. It is possible, however, that all are segments of larger features such as occupation surfaces and structure floors, and would have been categorized differently had they been complete.

SHELL CONCENTRATIONS

Eighteen of the features at 45-OK-2 are surface features consisting chiefly of large quantities of shell. They are unstructured features, irregular in shape and with diffuse boundaries. Only exterior shell layers are included here; at least one shell layer was found on a house floor but is treated as part of the floor. Features 18 and 111 are illustrated in Figures 6-24 and 6-25. Some of the features are quite large, extending up to 10 m in one direction. Although all have high densities of shell, they differ in the occurrence and frequency of other types of materials, and in the degree of internal structuring. Staining occurs below the shell in a number of the features. Several have high densities of bone, FMR, or artifacts as well as shell. Features 32, 36, and 104 contain discrete areas of dark staining, oxidized soil, and FMR. Features 36, 38, 43, 73, and 110 do have internally structured contents--groups or stacks of shells. Articulated shells occur in Features 34, 43, 59, and 102. The difference in degree of structuredness between these features is probably due to accidents of preservation and is not significant. Stacks of shell would be especially vulnerable to postdepositional disturbance which would destroy the structure.

Shell lenses are characterized by the highest shell densities of all feature types, coupled with low densities of lithic artifacts and FMR (Table 6-3 and Figure 6-1). The density of bone is high when measured by bone weight, and low when measured by bone count. In other words, there are more large pieces of bone in the shell middens. This is probably due to the lesser acidity of shell lenses, a condition that favors bone preservation. Ocher, and shell and bone artifacts were found in many shell layers (Table 6-4). In contrast to housefloors, flaked long bones are the sole type of bone artifact;

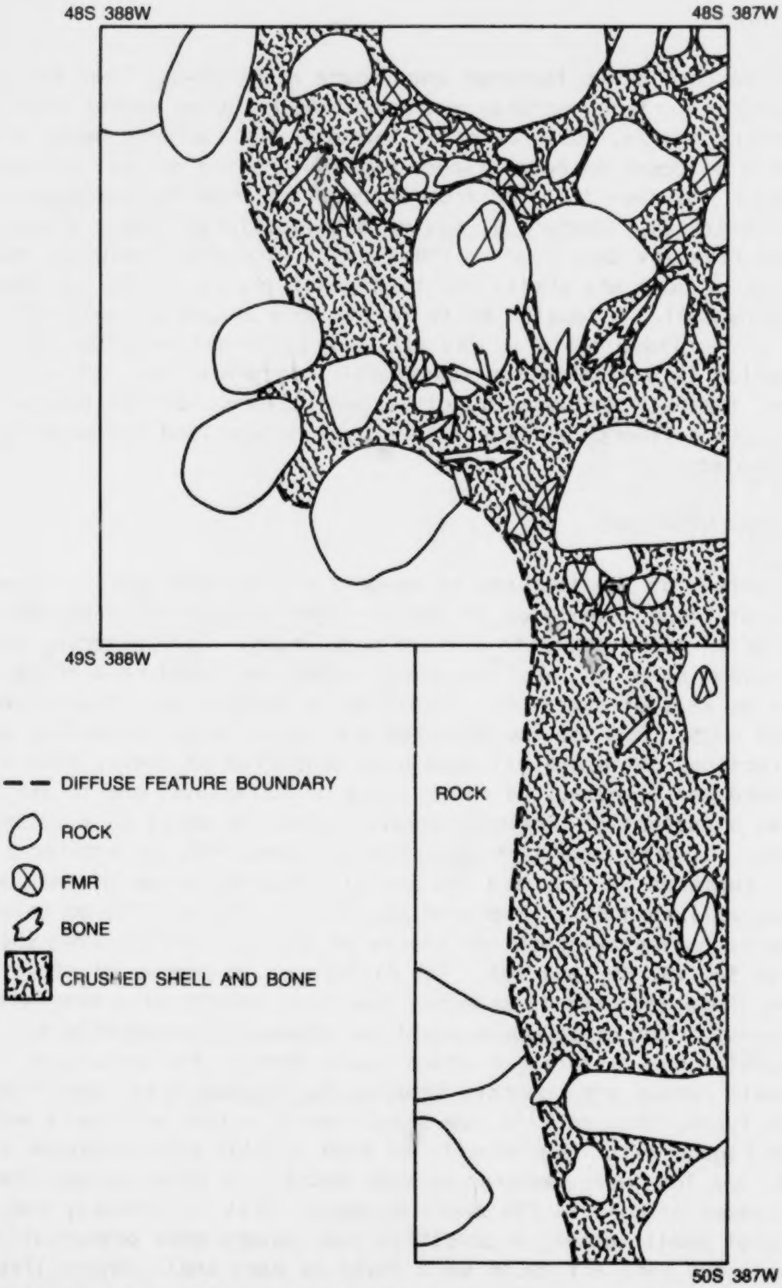

48S 388W
48S 387W
49S 388W
ROCK
50S 387W
DIFFUSE FEATURE BOUNDARY
ROCK
FMR
BONE
CRUSHED SHELL AND BONE

Figure 6-24. Plan view of shell layer Feature 18, 45-OK-2.

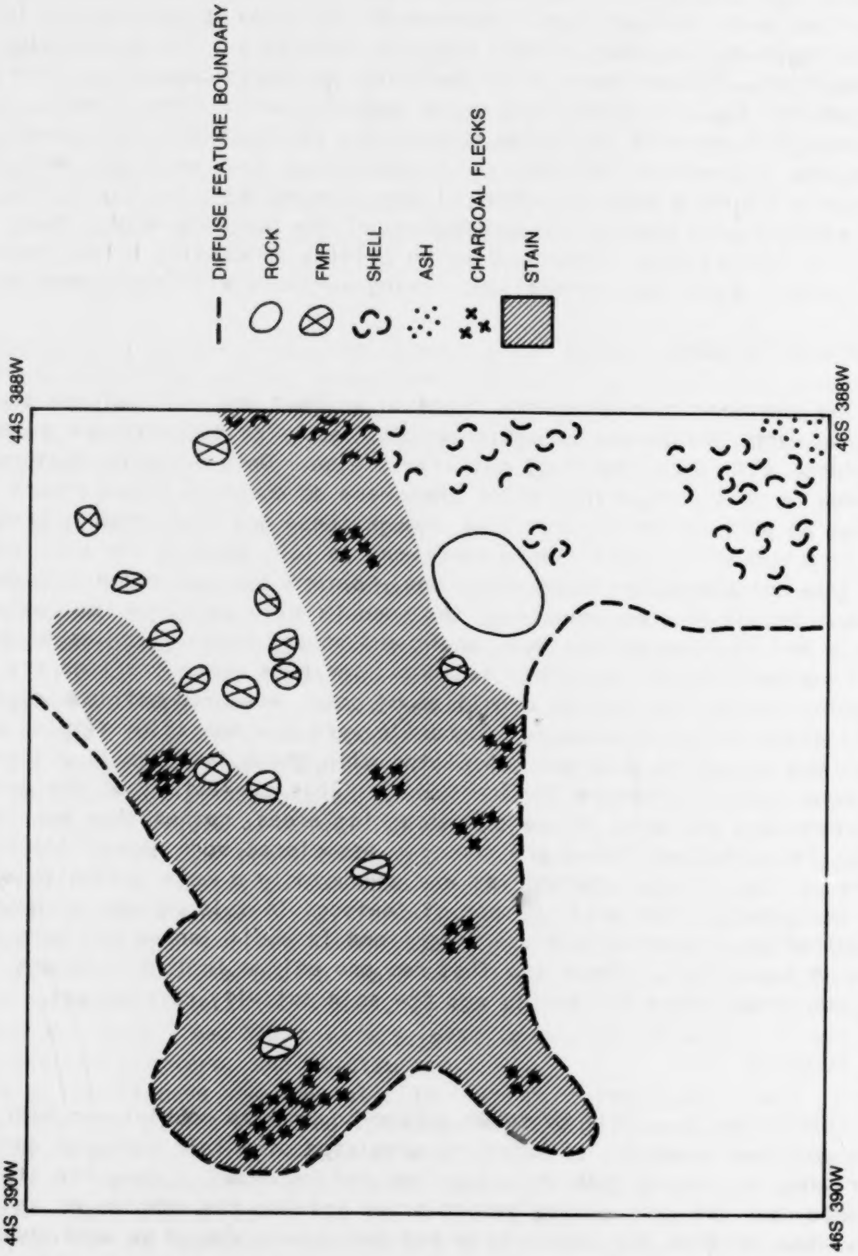

44S 388W
44S 390W
46S 388W
46S 390W
DIFFUSE FEATURE BOUNDARY
ROCK
FMR
SHELL
ASH
CHARCOAL FLECKS
STAIN

Figure 6-25. Plan view of shell layer Feature 111, 45-OK-2.

no shaped bone tools were found. Although litter density is low, there is considerble diversity of shaped or worn lithic artifacts (Table 6-5).

The shell concentrations are certainly related to the processing of freshwater shellfish for food. Whether the features include both primary processing areas and shell refuse dumps is uncertain. The association of stained areas, FMR and bone concentrations, and large numbers of worn and manufactured tools suggests that other domestic activities--cooking, eating, tool manufacture--went on in the same area. The abundant shell generally masked the discreteness of these other remains so they were not featured separately. A more detailed study of the internal structuring of the shell layer contents and statistical comparison of the contents might result in objective subdivisions corresponding to primary processing areas, secondary shell refuse areas, and generalized living surfaces with associated shell.

BONE CONCENTRATIONS

The two bone concentrations found at 45-OK-2 are unstructured surface features with diffuse and irregular boundaries. The contents are mammal bone, associated with dark staining, but little else. Only exterior features are included in this category; similar phenomena do occur on house floors but are counted as part of the floor. Even though these are high density areas of bone, the number of identifiable specimens is low, because the bone was generally splintered or decomposed. One, Feature 33, was found in a very wet matrix. Though in poor condition, the bone **in situ** gave the impression of being a set of once-articulated, short and robust bones, such as a deer foot.

In comparison to the other features, the bone concentrations are characterized by the highest densities of bone, measured both by weight and by count, while all other materials occur in very low densities (Tables 6-1 and 6-3). The only bone artifact associated with these features is a fractured long bone found in Feature 39 (Table 6-4). This suggests that the bone concentrations are bone refuse or butchering areas, rather than manufacturing areas. Two utilized flakes are the only associated worn shaped lithic artifacts (Table 6-5). Butchering was undoubtedly a more extensive activity than indicated by the small number of features in this category. Bone concentrations occurred on house floors and in shell lenses but were not featured separately. These two features are unique in that they are the only exterior areas where butchering was the sole activity carried out.

ROCK CLUSTERS

Feature 94 is a pile of seven unburnt quartzite cobbles--no matrix difference was observed. Feature 72 consisted of a thin circular dark stain underlying 10 cobbles (the rock type was not recorded). Only the stain was featured, but the dark matrix was observed between the cobbles as well as below them so that the cobble pile and dark stain should be considered as the same feature (Table 6-6). Feature 94 occurred within a house while Feature 72 is an exterior feature. Other piles of unburnt cobbles and pebbles occurred at 45-OK-2, but were not featured. None of the constituent cobbles were classified as net sinkers (Table 6-5), although two are hammerstones, and a projectile point and two tabular knives were also found in rock clusters.

Unmodified rocks may have been cached in small groups for use as net sinkers. Grabert makes this interpretation of two clusters of unmodified river pebbles found at 45-OK-52 (1968b:63). A cluster of eight was found in Housepit 1 and another group of 14 in the fill of an earth oven. The report does not indicate whether there were associated matrix changes. If these clusters of unmodified cobbles are indeed net sinker caches, the dark stain of Feature 72 would indicate that in this case the net sinkers were wrapped in the net, which subsequently decomposed. It is also possible that unmodified rocks were cached for other purposes, such as fire-building and cooking.

HISTORIC FEATURES

Old excavation units at 45-OK-2 were given feature designations to facilitate separation during excavation. Feature 37, located in Housepit 5, is part of a back-filled trench excavated by Osborne, as is Feature 77 in Housepit 3. Feature 91, also in Housepit 3, is a back-filled unit originally excavated by Lyman.

SUMMARY BY ZONE

The relative frequency of feature types varies considerably among the zones at 45-OK-2 (Table 6-8). The Zone 4 feature assemblage is dominated by shell concentrations and lacks structure floors, postmolds, and FMR scatters. The lack of other feature types may not be significant--it may be due to sampling error. The Zone 3 feature assemblage is similar to that of Zone 4. However, shell lenses are less abundant and structures are represented. Zone 2 has the largest and, not surprisingly, the most diverse, feature assemblage. It is characterized by the highest proportion of structure floors, pits, hearths, and FMR clusters, as well as the only rock clusters. Both of the Coyote Creek zones lack shell concentrations. Zone 1 is quantitatively distinct with the highest percentages of FMR scatters and ovens.

At 45-OK-2A, a number of differences in the relative frequency of feature types by zone (Table 6-8) are worth remarking. No features occur in Zones 3 and 4, which is consistent with their paucity of cultural material. The feature assemblages in Zones 1 and 2 differ radically in the feature types represented. Zone 2 has FMR clusters, pits, oven, and structure floors, while Zone 1 has FMR scatters, and oxidized soil.

We do not discuss the spatial distribution of features in each zone. A large proportion of the features are associated with houses, which are discussed in detail in the following chapter. Most of the exterior features are found in isolated units and are not directly associated with other features. Table 6-9 presents the instances of associations of features within each zone, that is features found within 2 m of each other horizontally.

Shell layers are associated with another shell layer, dark stains, and a hearth in Zone 4. In Zone 3 also shell layers are associated with another shell layer and dark stains, but we also find an FMR cluster associated with

Table 6-8. Frequency of feature types by zone, 45-OK-2 and 45-OK-2A.

Feature Type		45-OK-2				45-OK-2A	
		Zone				Zone	
		1	2	3	4	1	3
House Floors	N	3	8	2	-	-	3
	%	12.0	20.5	9.1			37.5
Occupation Surfaces	N	-	-	-	-	1	-
	%					14.3	
Postmolds	N	2	6	2	-	-	-
	%	8.0	15.4	9.1			
Pits	N	1	5	-	-	-	4
	%	4.0	12.8				50.0
Ovens	N	4	1	3	2	-	1
	%	16.0	2.6	13.6	9.5		12.5
Hearths	N	1	4	1	2	-	-
	%	4.0	10.3	4.5	9.5		
FMR Clusters	N	2	6	4	1	1	-
	%	8.0	15.4	18.2	4.8	14.3	
FMR Scatters	N	9	4	2	-	4	-
	%	36.0	10.3	9.1		57.1	
Oxidized Soil	N	-	2	1	2	1	-
	%		5.1	4.5	9.5	14.3	
Dark Stains	N	1	1	-	1	-	-
	%	4.0	2.6		4.8		
Shell Layers	N	-	-	7	13	-	-
	%			31.8	61.9		
Bone Scatters	N	1	1	-	-	-	-
	%	4.0	2.6				
Rock Clusters	N	1	1	-	-	-	-
	%	4.0	2.6				
Total	N	25	39	22	21	7	8

an oven, and a FMR scatter associated with a pit. Associations of exterior features in Zone 2 include FMR scatters with a posthole, a pit, and a hearth. In Zone 1, FMR scatters are associated with another FMR scatter and with a bone scatter. The number of associations in each zone is quite small, and the data suggest that they may be largely fortuitous. For example, all the Zone 1 associations involve FMR scatters, which are the most abundant feature type in the zone. Likewise, all of the Zone 4 and half of the Zone 3 associations involve shell layers, the most abundant feature types in these zones. Also the number of associations does not necessarily reflect the complexity of the deposits. In particular, shell layers often contained considerable internal variability which was not featured separately.

Nonetheless, the association and distribution of exterior features at 45-OK-2 do warrant more study. If features are broken down into their component parts and the associations studied, it would undoubtedly lead to the definition of some exterior occupation surfaces and the discovery of yet unrecognized houses.

Table 6-9. Associations between exterior features, 45-OK-2. (Z3 indicates one occurrence in Zone 3, etc.)

Feature type	Postmolds	Pits	Ovens	Hearths	FMR Clusters	FMR Scatters	Dark Stains	Shell Layers	Bone Scatters
Postmolds	–								
Pits	–	–							
Ovens	–	–	–						
Hearths	–	–	–	–					
FMR Clusters	–	–	Z3	–	–				
FMR Scatters	Z2	Z2 Z3	–	Z2	–	Z1			
Dark Stains	–	–	–	–	–	–	–		
Shell Layers	–	–	–	Z4	–	–	Z3 Z4	Z3 Z4	
Bone Scatters	–	–	–	–	–	Z1	–	–	–

7. HOUSES AND ACTIVITY AREAS

Analysis of finer temporal units and spatial distributions of artifacts and features within the zone is an important adjunct to the broad comparisons of zonal content made in the preceding chapters. The analytic zones necessarily span relatively long periods because finer temporal distinctions cannot be reliably correlated across the site. The zones combine the materials of numerous short-term activities, thus obscuring much small scale temporal and spatial variability in cultural activities. Detailed descriptions of individual features and localized artifact associations are needed to supplement zonal descriptions. They aid us in determining the cultural activities that produced the sites and in making inferences about cultural change through time.

Houses are our greatest asset in this type of study. Occupied for a relatively short time, they contain assemblages spanning a smaller time range than the zones. They are useful for smaller scale spatial analysis as well--the floors, frequently well preserved by fill, comprise undoubted associations of artifacts and features from which we can theoretically reconstruct activity areas. Examination of houses alone, however, would result in a biased picture of cultural activities at the site--we expect that activities outside the houses are qualitatively and quantitatively different. It is more difficult to define small scale assemblages outside of the house structures because there are no boundaries, but if the size and placement of sampling units allow, spatial patterning and significant associations can be defined in artifact and feature distributions.

The houses encountered at 45-OK-2 and 45-OK-2A are described, by zone, in detail. Although we present as much information as possible on the spatial distribution of artifacts and features on the house floors, we cannot rigorously analyze it because, in most cases, an insufficient portion of the floor was excavated. Only Zone 1 Houses 6, E, and F, which have large block excavations, warrant detailed analysis of artifact distributions. The low intensity of excavation units and the great distance between most units at 45-OK-2 and 45-OK-2A prevent us from analyzing exterior activity areas across the entire site. Within the circumscribed areas of the block excavations at 45-OK-2 we can, however, examine artifact and feature distributions to define activity areas which were too large or nebulous to be recorded in the field as features or structures. This is done only for Zone 1, which has the best horizontal coverage, permitting us to compare activities, both within and outside the houses.

45-OK-2

Excavation units were placed in five of the six housepits numbered by Osborne--Housepits 2, 3, 4, 5, and 6. Other surface depressions were mapped and labelled by this project with letters--Surface Depressions A-H (the Housepit 3 depression was also called Surface Depression C). Units were placed in all of these except Surface Depression H. At least possible structural evidence was found in all units excavated in surface depressions Buried structures with no surface indication also were found in random excavation units--these are also labelled with letters (Housepits I-N). The houses are described in chronological order by zone.

Table 7-1 summarizes structure type, dimensions, constituent features, zone assignment, and radiocarbon dates for each structure. The degree of detail in the discussion of each house varies, depending on the intensity of excavation, the size of the assemblage recovered, and the extent to which the structure must be reconstructed. Because of their large size and internal variability, and the lack of structural evidence except at the boundaries, structures were not necessarily recognized or recorded as such. Most of the houses at 45-OK-2 and 45-OK-2A, anticipated because of surface depressions, were excavated as structures, but a few, not apparent from surface manifestations, were not recognized until after excavation. These can be reconstructed, but in less detail, from stratigraphic profiles and unit level maps.

ZONE 4

Evidence of a possible structure in Zone 4 was found in the profile of 14S358W, a 1 x 2 m excavation unit located in the center of surface depression B. The sharply sloping contact between Stratum IX (DU 12) and Stratum X (DU 12) seen in the east wall (Figure 7-1) appears to be a constructed rim. A similar sloping boundary was seen in the west wall (not illustrated). A peak of bone and lithics are associated with Stratum IX, as is a broken opal biface, possibly a fragment of a large point. However, no staining or patterning was noted in plan, and no FMR occurred. Given the location of the unit near the hillside, it is also possible that the steep slope is a natural erosional cut.

Interpretation of this as a structure is based partially on comparison to Housepit 1 at 45-OK-208, a structure shallowly excavated into the cobbles and from an occupation somewhat older than Zone 4 (Chatters 1984). It consists of a shallow floor, 9 x 4 m in size, from which the cobbles have been cleared, and gently sloping walls. Several lanceolate points were recovered from the house and shell from the floor has been radiocarbon dated to 4590±110 B.P. The house dimensions probably were 11 x 6 m at the surface.

Table 7-1. Summary of houses and other structures, 45-OK-2 and 45-OK-2A.

Site	Zone	Structure	Location	Structure Type	Dimensions	Features	Radiocarbon Dates	Age Range
45-OK-2	1	E	Surface Depression E	Rectangular surface structure Mat lodge with board framing	12 x 10 m	4 = floor 66 = matting 8/11, 71, 74 = oven 118 = FMR scatter	Feature 4 196 ± 70 (B-2525)	1850-1894 A.D.
		F	Surface Depression F	Circular surface structure Mat lodge	6 meter diameter	9, 67 = floor 12 = postmold 45, 120 = FMR cluster 112, 118 = FMR scatter	Feature 9 227 ± 80 (B-4276)	1650-1800 A.D.
		6	Housepit 6	Rectangular surface structure Mat lodge	10 x 5 m walls 20 cm high, steeply sloping	88, 89, 90, 127, 130, 600 = floor 81/83 = postmold 122 = oven 95 = hearth 94 = rock cluster 129 = pit	floor, modern (<110 B.P.) (B-4281) (too young to be dendro-corrected)	1800-1830 A.D.
	2	2	Housepit 2	Circular semi-subterranean pit-house	Depression, 12 meter diameter walls 40 cm high, steeply sloping	200 = floor	Feature 200 1131 ± 168 (B-4280)	950-1300 B.P.
		3	Housepit 3	Circlar semi-subterranean pit-house	8 meter diameter	19, 65 = floor 22, 107 = postmold 97 = hearth 100 = pit	Feature 97 1112 ± 95 (B-4275)	1000-1200 B.P.
		4	Housepit 4	Circular semi-subterranean pit-house	Depression, 13.3 x 12.2 m wall 60 cm high	68 = floor 64 = fill	Feature 68 529 ± 88 (B-4283)	450- 600 B.P.
		5	Housepit 5	Circular shallow depression	Depression, 5.6 x 4.6 m rim 10-20 cm high	38, 40, 51, 52 = floor 41 = pit	-	Oldest house in Zone 2 (?)
		A	Surface Depression A	Circular semi-subterranean pit-house	Depression, 6 m diameter rim 30 cm high	-	-	Similar to House L (?)
		G	Surface depression G	Rectangular semi-subterranean pit-house	8 m wide walls 40-50 cm high, gently sloping	76, 103, 105 = floor	-	?
		L	North of surface depression F	Circular semi-subterranean pit-house	5 m diameter walls 40-50 cm steeply sloping	114, 115 = hearth	Floor 1268 ± 95 (B-4277)	1200-1350 B.P.
		M	36S/355W 38S/357W	Circular (?) semi-subterranean pit-house	(?) wall 50 cm high, steeply sloping	131, 135 = post-mold 132, 134 = FMR cluster	-	Similar to House G (?)

Table 7-1. Cont'd.

Site	Zone	Structure	Location	Structure Type	Dimensions	Features	Radiocarbon Dates	Age Range
45-OK-2	2	N	Housepit 3 depression	Large oval pit with wood superstructure	3 x 2 m walls 30 m high, steeply sloping	42, 48 = wall and floor 68 = postmold	Feature 48 830±80	775- 900 B.P.
	3	D	Surface Depression D	Shallow circular structure	8 m diameter minimum walls 20 cm high, gently sloping	27, 82 = floor 78 = oven	-	-
		I	18 S/356W 20S/356W	Shallow structure	-	28 = floor 55, 56 = postmold 54 = FMR cluster	-	-
	4	B	Surface Depression B	-	Depression 8 m in diameter	-	-	-
45-OK-2A	2	8	Housepit 8	Circular semi-subterranean pithouse	-	10 = floor 20 = pit	-	-
		9	Housepit 9	Circular semi-subterranenn pithouse	-	11, 15, 16 = floor and wall	-	-
		Z	Surface Depression Z	Circular semi-subterranean pithouse	-	19 = floor, wall and fill	-	-

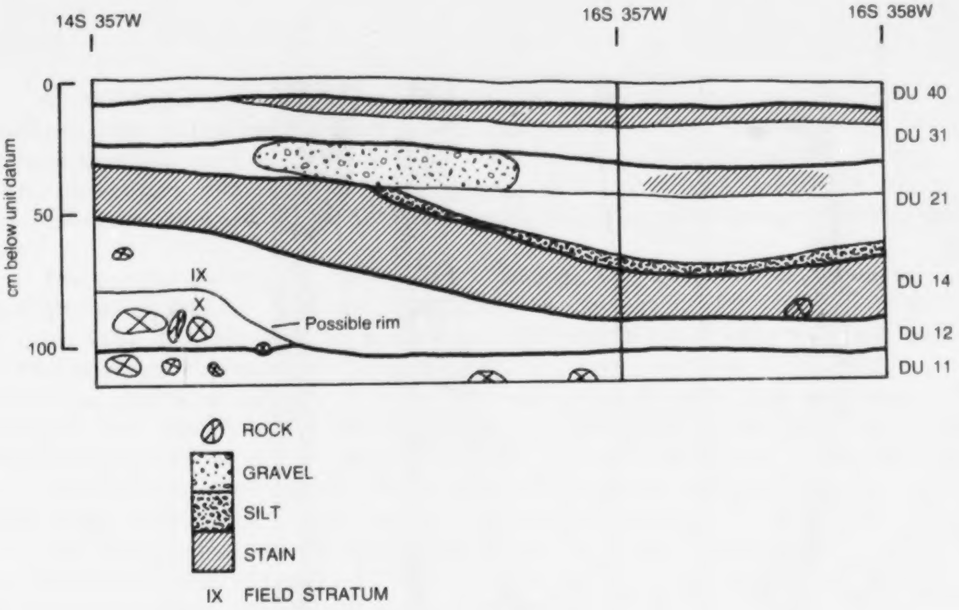


Figure 7-1. Profile of House B, 45-OK-2.

ZONE 3

Two probable structures were excavated in Zone 3. Details of their shape, size, and construction are scant because of limited exposure and because they were not recognized as houses in the field.

House D

The area between Housepit 3 and Surface Depression D is underlain by a structure assigned to Zone 3. We have called it House D although it is not responsible for creating Surface Depression D. The latter was determined to be not a depression at all, but rather a flat area between the rims of backdirt thrown up out of the excavations of Houses 3 and N. House D cannot be reconstructed in any detail; Feature 49, Housepit 3, and Osborne's excavation units intrude on it (see Figure 7-7). The structure is shallow relative to most semi-subterranean housepits--the gently sloping walls are about 20 cm high (Figure 7-2). The floor, a dense layer of shell and other debris, was excavated as Feature 92 in 26S367W, and as Feature 27 in 30S367W. Although not featured in adjacent units 26S369W, 28S371W, 28S369W, 28S368W, and 30S369W, it can be traced directly in the profiles. An oven (Feature 78) is associated with the floor in 28S371W. It is possible that this dense deposit of cultural materials is actually an open occupation surface. The gentle, shallow slope interpreted as the rim could be a natural slope.

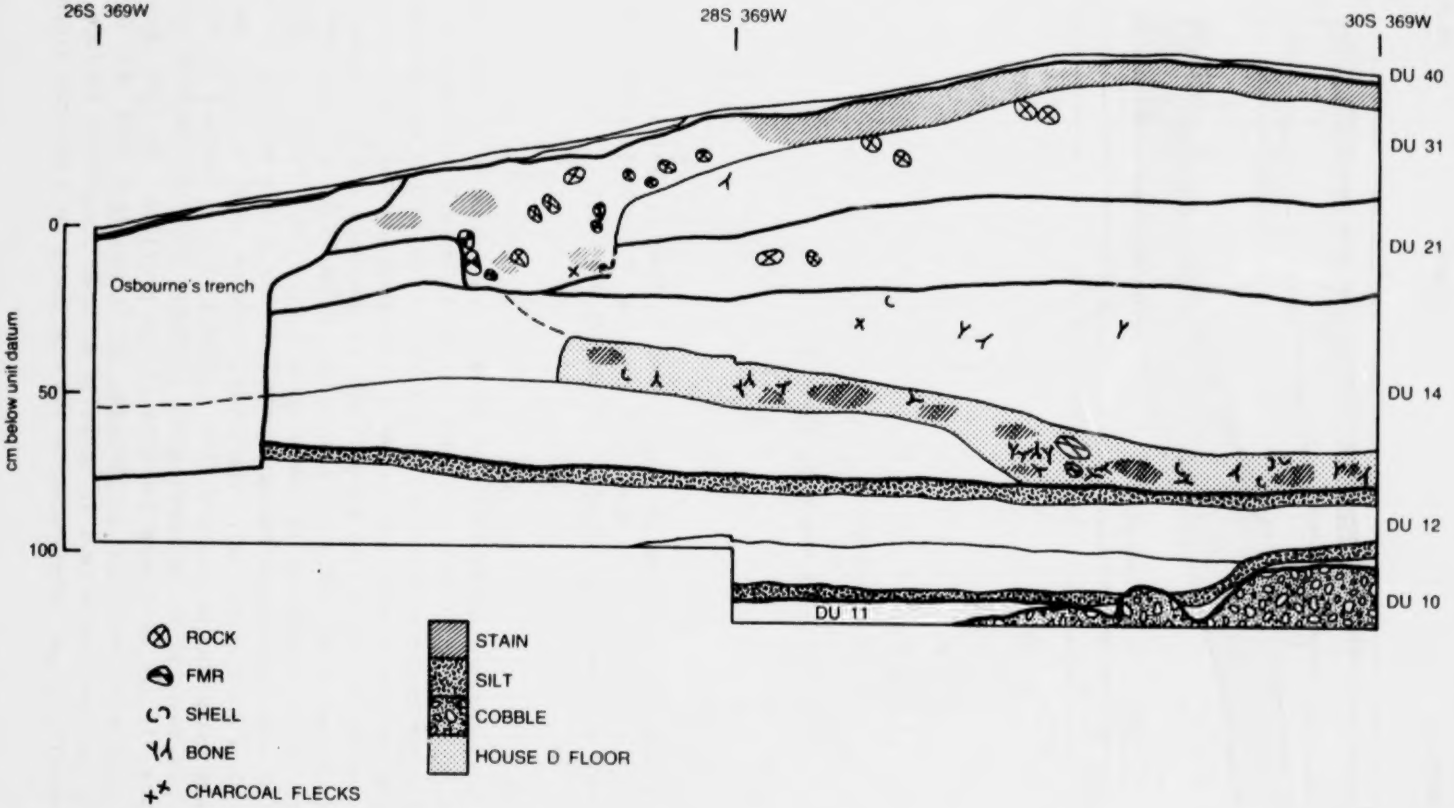

26S 369W
28S 369W
30S 369W
DU 40
DU 31
DU 21
DU 14
DU 12
DU 10
DU 11
Osbourne's trench
cm below unit datum
0
50
100
ROCK
FMR
SHELL
BONE
CHARCOAL FLECKS
STAIN
SILT
COBBLE
HOUSE D FLOOR

Figure 7-2. Profile of House D, 45-OK-2.

House I

At the time this report was begun, two different features had been labelled I on different project maps. One was a surface depression south of Surface Depression G (see Figure 1-9), which was later discounted as a cultural feature and never tested. During preliminary reporting of the site, the label was re-used for a buried structure; this later usage is retained here.

The buried structure, assigned to Zone 3, was encountered in units 18S356W and 20S356W. The abrupt and sloping contact of Stratum VII with Stratum VIII (Figure 7-3) is the wall. Two postmolds (Feature 55 and 56), and an FMR scatter (Feature 54) occurred on the floor (Stratum VII/Feature 29), which was characterized by diffuse charcoal staining and high bone densities. The excavated assemblage from the floor includes large amounts of bone, and moderate amounts of shell hinges and FMR. Of the 1647 bones collected from the floor, seven were identified as deer and fifteen are deer-sized. The tool assemblage includes a biface and three bone artifacts, but no flakes. A Nespelem Bar projectile point was found on the floor, and a Rabbit Island B in the occupation overlying the floor (Figure 7-4). The floor slopes gently northward and does not appear in the northeast corner of 18S356W where it is truncated by another sloping stained layer, Stratum IV, which may indicate later reuse of the structure.

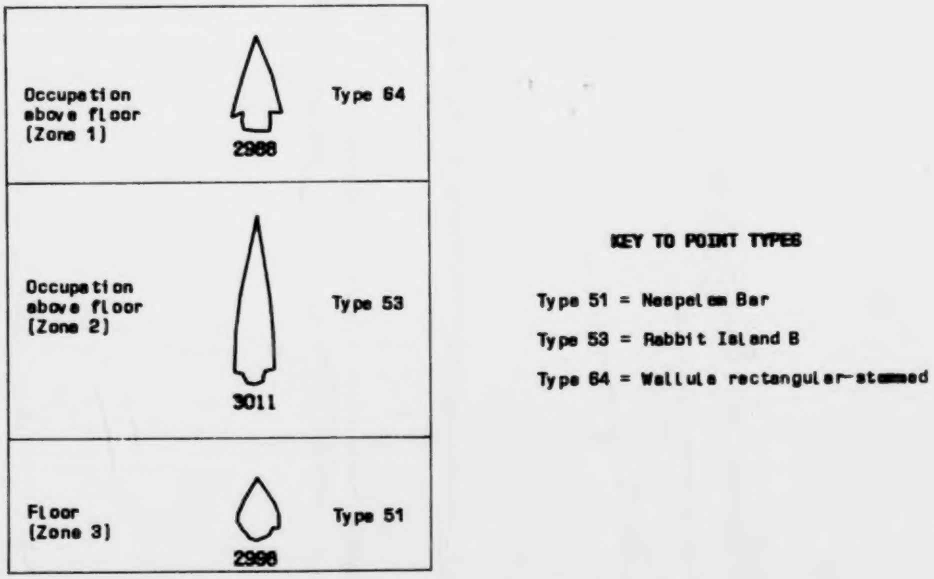

Occupation above floor (Zone 1)
2988
Type 64
Occupation above floor (Zone 2)
3011
Type 53
Floor (Zone 3)
2998
Type 51
KEY TO POINT TYPES
Type 51 = Nespelem Bar
Type 53 = Rabbit Island B
Type 64 = Wallula rectangular-stemmed

Figure 7-4. Projectile points from excavation of House I, 45-OK-2.

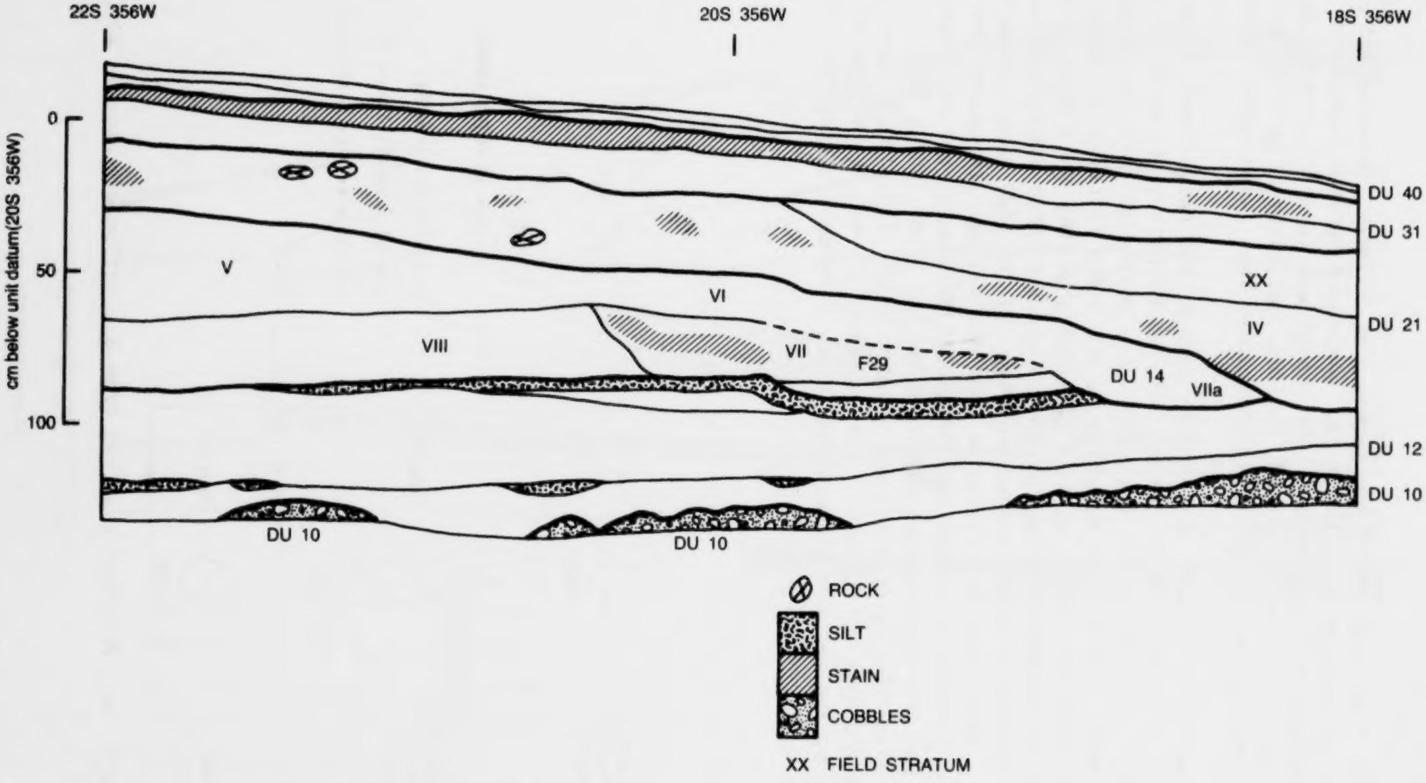

22S 356W
20S 356W
18S 356W
cm below unit datum(20S 356W)
0
50
100
V
VI
VIII
VII
F29
DU 14
VIIa
XX
IV
DU 40
DU 31
DU 21
DU 12
DU 10
DU 10
DU 10
ROCK
SILT
STAIN
COBBLES
XX FIELD STRATUM

Figure 7-3. Profile of House I, 45-OK-2.

ZONE 2

The greatest number of structures was found in Zone 2. All are semi-subterranean housepits with relatively steep walls. Most have radiocarbon dates and projectile points and can be tentatively chronologically arranged within Zone 2.

House 2

The designation Housepit 2 was given by Osborne to a surface depression measuring 11.5 m north-south and 12.3 m east-west. Excavations by Osborne and CJDCRP have demonstrated a semi-subterranean housepit underlying this depression, constructed and occupied around 1000 B.P.

The 2 x 2 m-unit (29S360W) excavated on the western rim of the surface depression, intersected a portion of the rim and floor of the housepit, which originates in DU 21 (Figure 7-5). The steeply sloping side wall, 40 cm high, cuts through older strata including Feature 102, an extensive shell lens in DU 14/Zone 3. The wall was marked in excavation by dark staining, charcoal flecks and pieces, and oxidized soil, the remains of walls of wood or other organic materials. The flat, level floor, indicated by a soft, dark-stained matrix with scattered areas of oxidized soil, extended right up to the wall. A thin layer of organic material which appeared to be woven matting was found in one area. Numerous large bones, shell, and pieces of charred wood were scattered on the floor. The badly burnt and decomposed bone was much fragmented in removal, nonetheless, a large number of elements were identifiable. Deer is the predominant species, and the entire skeleton is represented--vertebrae, pelvis, ribs, skull, limbs, and feet. A radiocarbon date of 1131±168 (B-4280) was obtained from the floor. The two projectile points from the floor, a Columbia Corner-notched B and a Wallula Rectangular stemmed (Figure 7-6) are consistent with this date.

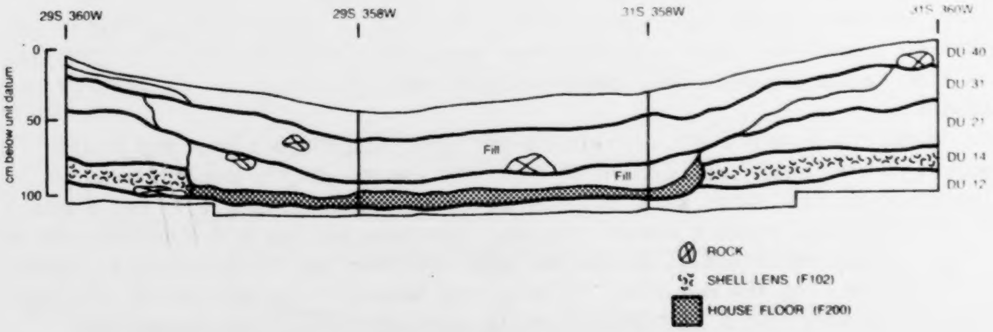


Figure 7-5. Profile of House 2, 45-OK-2.

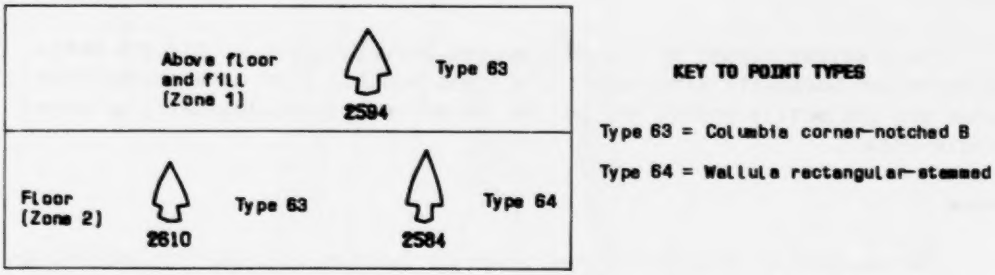


Figure 7-6. Projectile points from excavation of House 2, 45-OK-2.

Additional information on the organization of House 2 is provided by the 5 x 5-ft (1.6 x 1.6 m) test pit excavated by Osborne in the center of the depression down to the cobbles. A hearth was encountered on the floor--the trench was then extended to the southwest with three 2.5 x 2.5-ft (.8 x .8 m) pits to uncover the rest of it. Centrally located in the depression, the hearth measured 72 x 39 x 16 cm, and had a thick bed of ash, two pieces of charcoal, and no FMR.

House 3

The designation Housepit 3 was given by Osborne to a depression measuring 10.5 m (north-south) by 11.5 m (east-west). Excavations by Osborne and CJDCRP have revealed a semi-subterranean pit house structure underlying the depression, with a floor dated at approximately 1000 B.P.

The nine units excavated within or on the rim of the Housepit 3 depression encountered three structures (Figure 7-7). Housepit 3, responsible for the surface depression, is a semi-subterranean pit-house originating in DU 21 (Figure 7-7). To the south it intersects House D, in DU 14. Structure N, also originating in DU 21, is intrusive into the southwest rim in unit 24S368W. Reconstruction of the housepit is made more difficult by the intrusive feature and Osborne's trench. The rim is readily recognizable in 20S373W, where the floor was excavated separately (Feature 65). In 22S372W, the floor also was excavated separately (Feature 19), but not in 24S372W or 24S368W.

A hearth (Feature 97) containing juniper, lodgepole pine, and small amounts of red cedar was excavated near the center of the depression. Also found on the floor were two postmolds (Features 22 and 107) and a small pit in which was found a human cranium. The base of the pit (Feature 100) was filled with a dark matrix, while the upper portion was filled with a lighter matrix resembling the material in which the housepit was excavated, although slightly darker. This indicates that it was dug through the floor, the cranium and other contents placed in the bottom, and then filled with the backdirt from the excavation. The cranium may have been accidentally interred during excavation of the housepit and reburied. A resin coated artifact made of conifer wood and a piece of cordage of unknown materials were found on the floor near Feature 100.

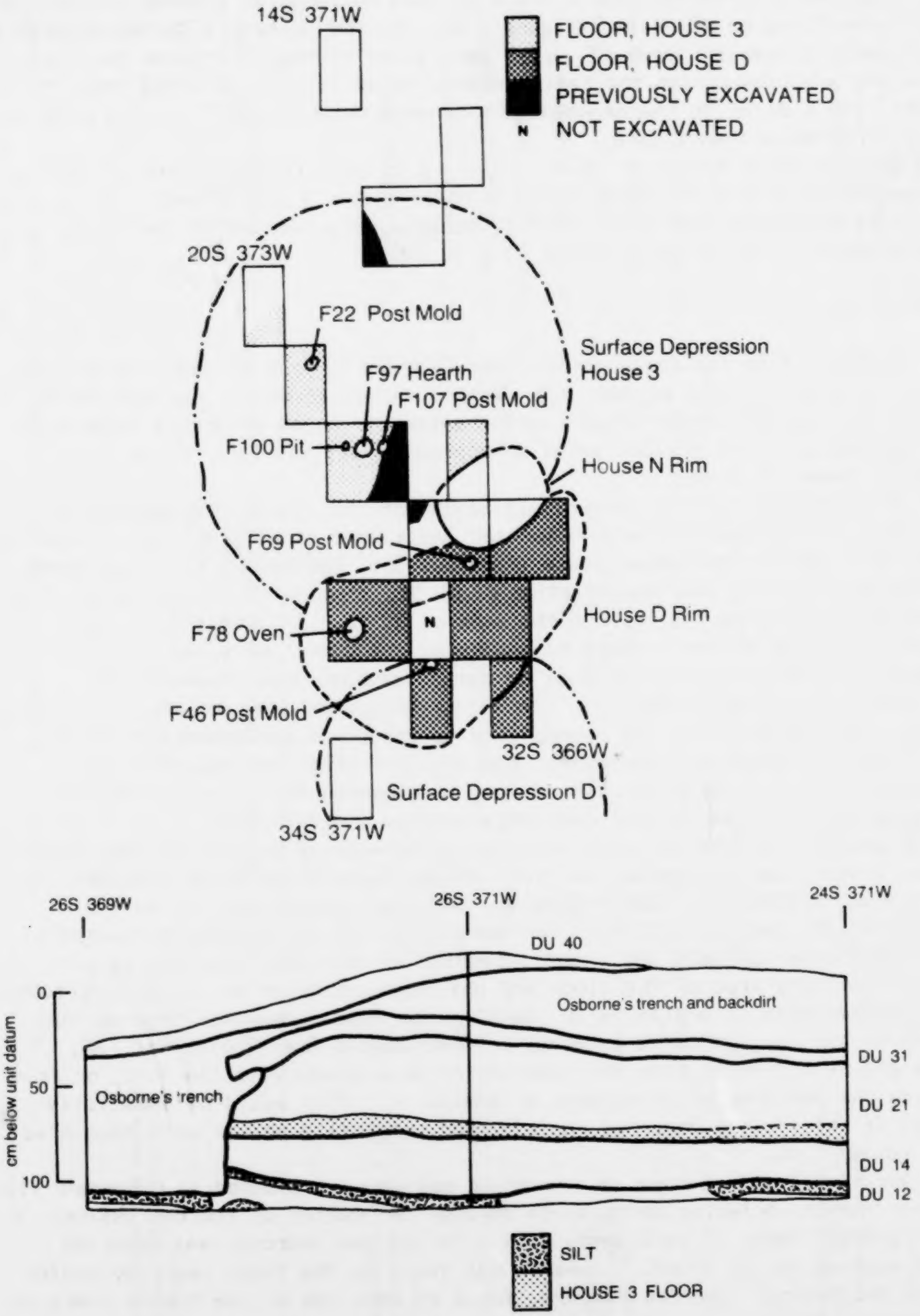

14S 371W
FLOOR, HOUSE 3
FLOOR, HOUSE D
PREVIOUSLY EXCAVATED
N NOT EXCAVATED
20S 373W
F22 Post Mold
Surface Depression
House 3
F97 Hearth
F107 Post Mold
F100 Pit
House N Rim
F69 Post Mold
House D Rim
N
F78 Oven
F46 Post Mold
32S 366W
Surface Depression D
34S 371W
26S 369W
26S 371W
24S 371W
DU 40
Osborne's trench and backdirt
DU 31
DU 21
DU 14
DU 12
Osborne's trench
0
50
100
cm below unit datum
SILT
HOUSE 3 FLOOR

Figure 7-7. Profile and plan of House 3, 45-OK-2.

A Columbia Corner-notched B and a Wallula Rectangular stemmed projectile point were found on the floor (Figure 7-8). Another Columbia Corner-notched B point and a Columbia Stemmed C point were found in the fill above the floor. These are consistent with the radiocarbon date of 1112±95 obtained from the hearth, and similar to the assemblage recovered from Housepit 2, which has a roughly contemporaneous date.

Osborne excavated a 3 x 5-ft (1.0 x 1.6 m) unit in the center of the depression which was extended to a 3 x 10-ft (1.0 x 3.3 m) trench. A partially charred wooden post found by Osborne is a remnant of the house superstructure. It measures 140 x 20 x 10 cm.

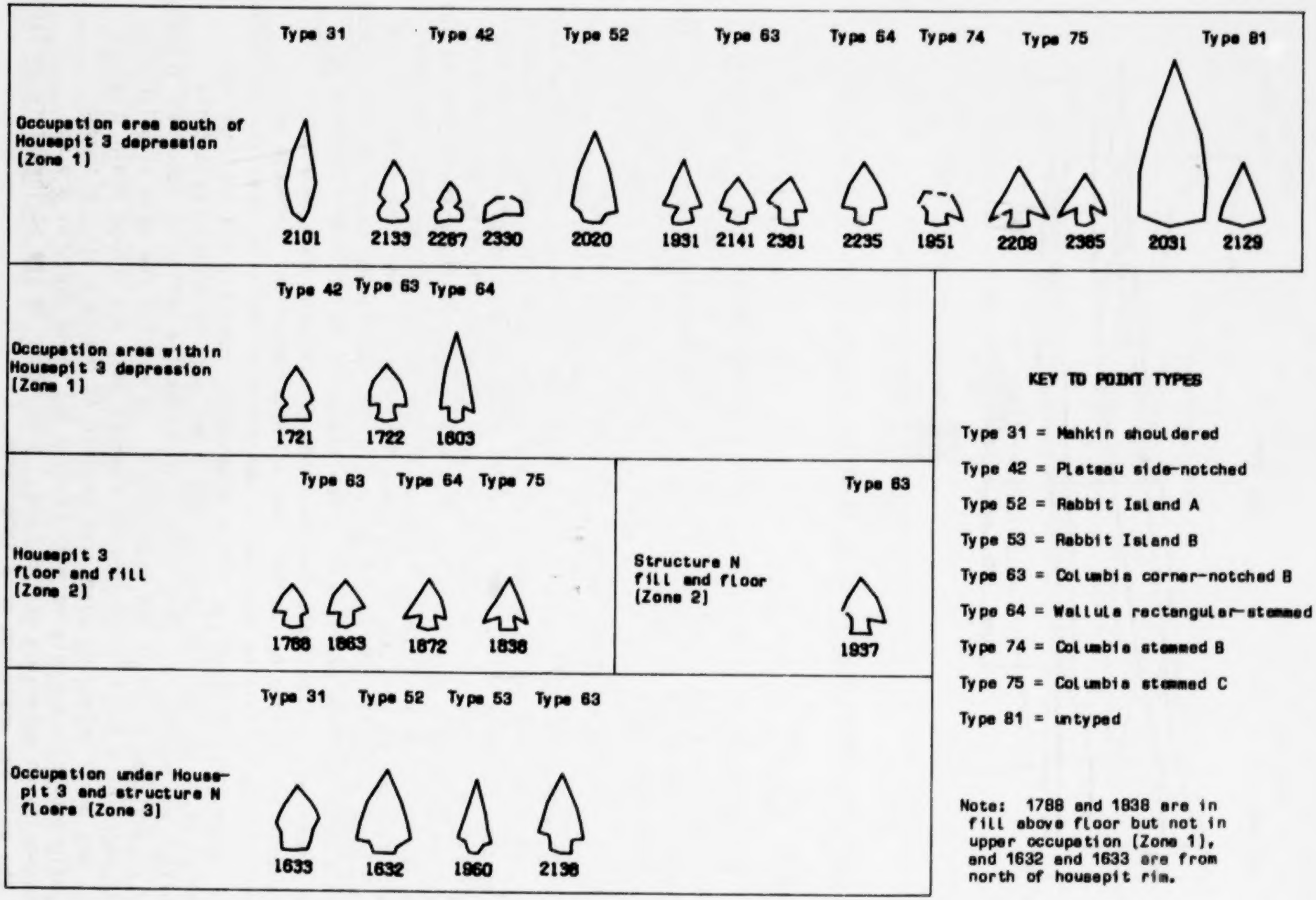
House 4

Housepit 4 is the designation given by Osborne to a surface depression measuring 13.3 m x 12.2 m, near the western end of 45-OK-2. Excavations by Osborne and CJDCRP reveal a semi-subterranean pit house structure underlying the depression, with a floor dated at approximately 500 B.P. It is the youngest house in Zone 2.

We excavated one 2 x 2-m unit (53S493W) on the rim of the depression. This unit intersected the wall--somewhat indistinct stratigraphically--and the floor of a semi-subterranean house (Figure 7-9). The housepit was excavated at some point during the accumulation of DU 21, through the loamy sands of DU 21 and DU 14, and partially into the sand of DU 11. Excavated to a depth of 80 cm, it is one of the deepest housepits at the site. Only one floor is apparent in the structure--a layer of darkly stained sand (Feature 68) radiocarbon dated at 529±89 B.P. The fill, designated Feature 64, is assigned to DU 21 on the basis of its resemblance to the DU 21 sediments outside the rim. The fill seems to have accumulated rapidly after the housepit was abandoned, burying the floor and helping to preserve it. DU 31 uniformly overlies the fill, walls, and sediments outside the rim.

A possible butchering area, consisting of a dense cluster of deer-sized mammal bones, was exposed on the floor of the house. The bones included smashed and broken long bone fragments, scapulae, mandibles, and antler fragments, all partially burnt. The associated tool assemblage consisted of only two cobble choppers and a small tabular knife. This area may be a special activity area on the floor and not representative of the entire floor. The concentration of artifacts in the fill was less dense than that on the floor; it too was dominated by bone, but included a few lithics and FMR. These may be artifacts from the floor which were mixed with the fill, or from outside the features which slumped or washed in. This would be especially likely if the filling occurred rapidly. No projectile points were recovered from Housepit 4.

Additional information on the house design was revealed in Osborne's 11.5 x 1.6-m trench, oriented north/south through the center of the depression. A stratigraphic level of dark sandy soil with ash and charcoal was observed which equates to our floor. A hearth was found on the floor near the center of the depression. Charred timbers, found at each end of the trench where it intersected the housepit rim, are the remains of the walls.


Type 31
Type 42
Type 52
Type 63
Type 64
Type 74
Type 75
Type 81
Occupation area south of Housepit 3 depression (Zone 1)
2101
2133
2287
2330
2020
1931
2141
2381
2235
1951
2209
2385
2031
2129
Type 42
Type 63
Type 64
Occupation area within Housepit 3 depression (Zone 1)
1721
1722
1803
Type 63
Type 64
Type 75
Housepit 3 floor and fill (Zone 2)
1788
1863
1872
1838
Type 63
Structure N fill and floor (Zone 2)
1937
Type 31
Type 52
Type 53
Type 63
Occupation under Housepit 3 and structure N floors (Zone 3)
1633
1632
1960
2138

KEY TO POINT TYPES

Type 31 = Mahkin shouldered

Type 42 = Plateau side-notched

Type 52 = Rabbit Island A

Type 53 = Rabbit Island B

Type 63 = Columbia corner-notched B

Type 64 = Wallula rectangular-stemmed

Type 74 = Columbia stemmed B

Type 75 = Columbia stemmed C

Type 81 = untyped

Note: 1788 and 1838 are in fill above floor but not in upper occupation (Zone 1), and 1632 and 1633 are from north of housepit rim.

Figure 7-8. Projectile points from House 3, 45-OK-2.

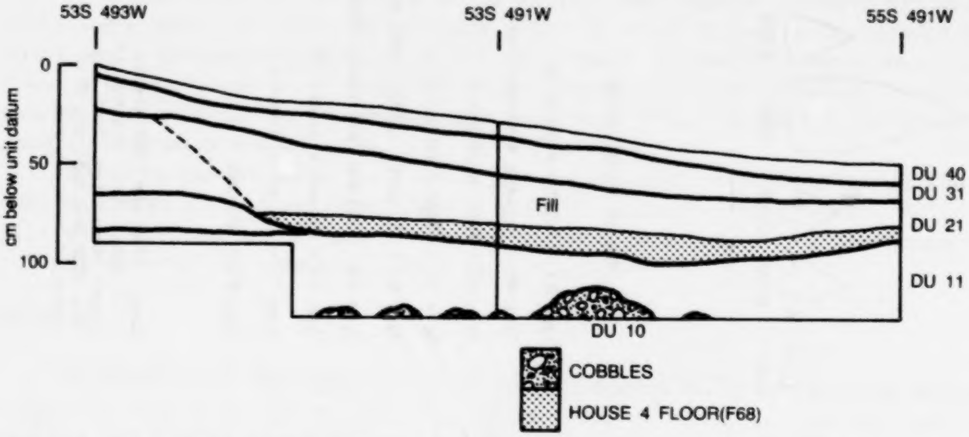


Figure 7-9. Profile of House 4, 45-OK-2.

House 5

A roughly circular surface depression at the western end of the site, measuring 5.6 m x 4.6 m, was designated by Osborne as Housepit 5. The depression was no more than 20 cm deep along the southern rim facing the river and 10 cm deep along the northern rim. Excavations by Osborne yielded no indication of a structure, while the deeper excavations by CJDCRP indicate a possible semi-subterranean housepit structure of uncertain age.

We excavated three 1 x 2-m units in the Housepit 5 depression (Figure 7-10). Unit 82S549W was placed to avoid Osborne's test trench. The northernmost unit, 78S551W, yielded no evidence of a structure definite enough to feature, or be seen in the profile. The excavator noted an area of gray silt at the southern end of the unit between UL 70 and 100 which might be housepit fill. Two rims bounding a darkly stained area are visible in the 82S549W profile but they do not align with the orientation of the surface depression. The dark stain (Feature 51) presumably represents the floor of the structure. In one small area of the floor (less than 10 x 10 cm) were found numerous tiny flakes of a pinkish mottled chert, with a few flakes of maroon chert (Feature 52). The flake's small size indicates that they are residue from secondary manufacturing or shaping, rather than primary reduction. Although such manufacturing activities apparently took place at the site, they did not leave such dense concentrations of flakes elsewhere. Possibly the debitage was cleaned up or perhaps the flaking took place outside structures and the debitage was scattered. This floor lies below the bottom of Osborne's trench, and is assigned to DU 21 and thus Zone 2. In 84S551W the same stratigraphic unit contains a shell concentration (Feature 38), and orange stain (Feature 40), and a pit extending down from Feature 40 (Feature 41). Although stratigraphically correlated with Feature 51, these features are not necessarily an extension of the floor. They occur in the southwestern portion of the unit and unstained area intervenes.

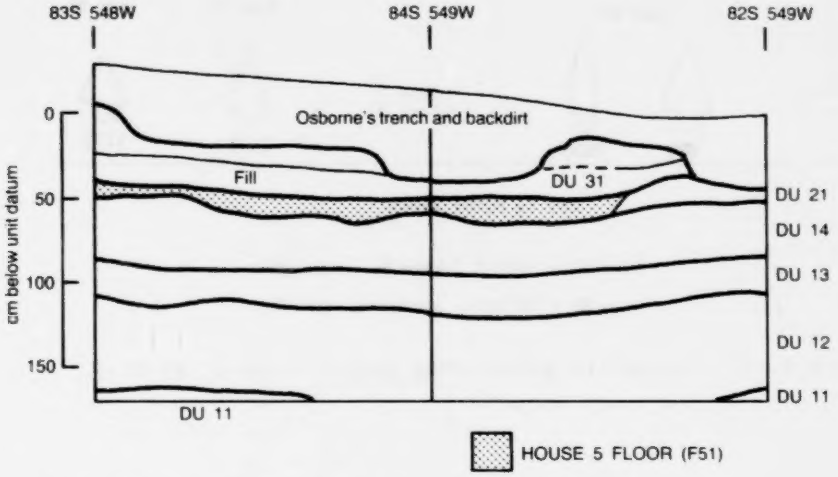
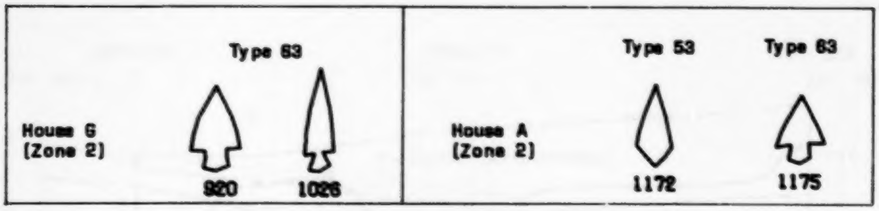


Figure 7-10. Plan and profile of House 5, 45-OK-2.

Osborne excavated a 3 ft x 10 ft (7.6 x 1.0-m) trench oriented north/south through the depression. The following description of the work is taken from the original field records. The stratigraphic profiles of the trench yielded no indication of a structure. Two features--firepits associated with historic materials--were encountered in the trench. Feature 1 was encountered within 15 cm of the surface, and contained a large cartridge shell, a round nail, a square nail, two glass beads, stone projectile points, scrapers, and a flake. Feature 2 was found 30-60 cm below the surface, and contained nails, cartridges, and three trade beads. Near these two features, a celluloid comb, a metal can, a piece of metal, a metal cutter, and a Canadian dime, possibly dated 1893, were found. The profiles show that Osborne's trench was not deep enough to encounter the floor described above. It is surprising, however, that the CJDCRP excavations did not encounter the historic occupation which Osborne found. The only historic artifacts from this area are two nails, one in UL10, 78S551W, the other in UL30, within the trench backdirt (Feature 37) in 84S551W. The earlier excavation may have totally removed evidence of the late occupation from the area excavated by the CJDCRP.

House A

A sloping stratigraphic contact in DU 21 in the profile of 14S346W, southeast of the mapped rim of Surface Depression A, may be the rim of a Zone 2 house underlying the depression. An area of oxidized soil (Feature 28) occurs on the upper edge of the possible rim, and a peak of cultural materials is associated with the sloping stratum. In 12S349W, a 1 x 2-m unit in the center of the surface depression, a peak of cultural materials in Zone 2 may represent a floor, although no staining was noted. A Rabbit Island A and a Columbia corner-notched B point are associated with this level (Figure 7-11).



KEY TO POINT TYPES

Type 53 = Rabbit Island B

Type 63 = Columbia corner-notched B

Figure 7-11. Projectile points from Houses A and G, 45-OK-2.

House G

This circular surface depression, 10 m in diameter, was first designated by the CJDCRP. Four 2 × 2-m units forming an L-shaped trench were excavated in this depression. The underlying cultural feature was found to lie considerably inside the lip of the surface depression it created (Figure 7-12). The northernmost excavation unit lay entirely outside the rim, which was encountered 50 cm below surface (Figure 7-13). The gently sloping walls, not obvious in all profiles, are approximately 40-50 cm high. The shape of the structure appears to be rectangular. The floor (Features 76 and 105) was characterized by two different matrices, both darker, more gravelly, and loamier than the surrounding sediments. Most of the 24 FMR were associated with the grayish, charcoal flecked matrix. Other artifacts associated with the floor included 642 bones, eight shell hinges, 217 flakes, and 16 worn or manufactured tools. Six of the bones were identified as elk, four as deer-sized. The density of bone increased towards the northern part of the floor; at the northern periphery lay a bone concentration, Feature 103. This compact collection of 914 bones, three flakes, and two shell hinges was found under a large flat stone. Nine elk bones were identified, as well as nine from a deer-sized animal. Two Columbia Corner-notched B points were found in the house, one just above the floor (M#920) and the other in the fill 20 cm above the floor (M#1026).

House K

What appears to be a structure rim was found in the northeastern portion of 18S370W. No definite floor was encountered in 16S368W, which is adjacent to the northeast.

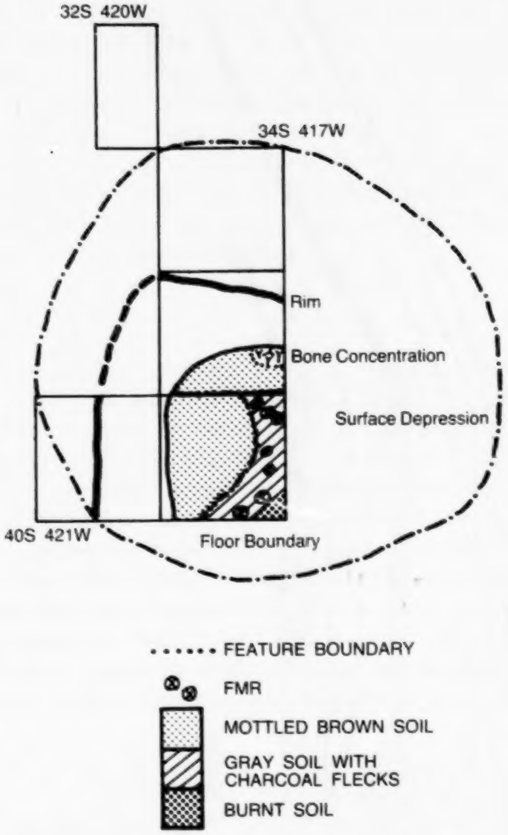

32S 420W
34S 417W
Rim
Bone Concentration
Surface Depression
40S 421W
Floor Boundary
FEATURE BOUNDARY
FMR
MOTTLED BROWN SOIL
GRAY SOIL WITH CHARCOAL FLECKS
BURNT SOIL

Figure 7-12. Plan of House G, 45-OK-2. Floor is Feature 105 in 36S417W and Feature 76 in 38S417W.

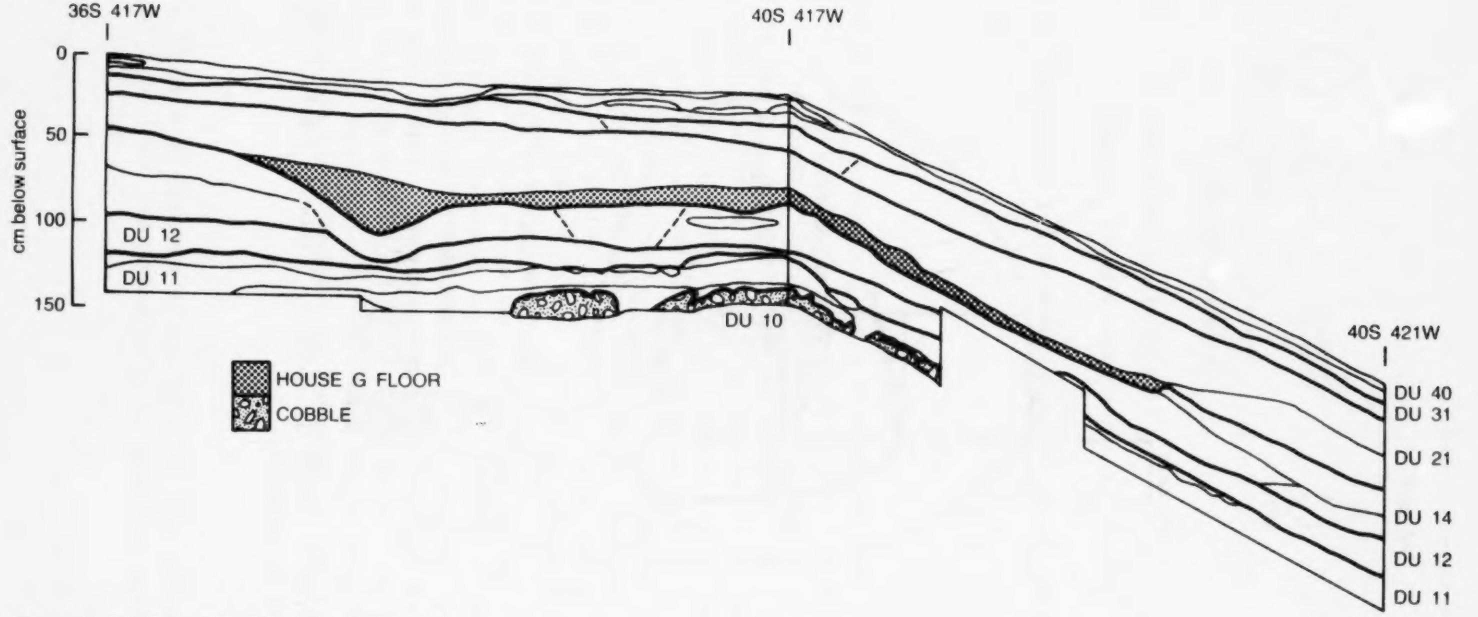

36S 417W
40S 417W
40S 421W
0
50
100
150
cm below surface
DU 12
DU 11
DU 10
DU 40
DU 31
DU 21
DU 14
DU 12
DU 11
HOUSE G FLOOR
COBBLE

Figure 7-13. Profile of House G.

House L

A buried structure not reflected in the surface topography was found in the area between 30 and 40S and 380 and 390W. It is a circular semi-subterranean housepit, approximately 5 m in diameter at the rim. The steeply sloping walls are approximately 0.75 m high (Figure 7-14). A well-preserved fireplace, a circular concentration of rocks and FMR, was uncovered in the center of the house floor.

A radiocarbon date of 1268±95 B.P. was obtained from the floor, making this the oldest house in Zone 2. Four projectile points were associated directly with the floor--a Nespelem Bar, a Wallula Rectangular-stemmed, a Columbia Stemmed B, and a Columbia Stemmed C (Figure 7-15). The Rabbit Island A point came from a unit level in which the floor was excavated mixed with the underlying Zone 3. The level was assigned to Zone 2 and the floor because the plan map indicates that the floor comprised 75% of the level. However, the point could have been from the older occupation. The Rabbit Island B point was found in the fill above the floor.

House M

The rim of a buried structure, stratigraphically assignable to Zone 2, was visible in the west wall of 36S355W. About 55 cm high, it sloped gently to the southwest. A stratum of relatively dense cultural materials in adjoining units 38S357W and 39S359W is apparently the floor; however, we cannot directly trace the connection between the floor and rim because the north wall of 38S357W was not profiled. The floor itself was not featured but two associated postmolds (Features 131 and 135) were recorded in the SE quad of 39S359W and two FMR clusters (Features 132 and 134) in the SW and SE quads of 38S357W. Two Columbia corner-notched A point (Figure 7-15: Master #2656 and 2653) were found on the floor, and another Columbia corner-notched A point and a Quilomene Bar basal-notched A point found above the floor in the Zone 2 fill. Two Rabbit Island stemmed series points were found immediately below the floor.

Structure N

Structure N is a small structure intrusive in the southeast rim of Housepit 3 (Figure 7-7, 7-16). A radiocarbon date of 839±68 B.P. was obtained from wood within the structure, which is unique at the site. Although it is similar in some ways to the other semisubterranean housepits, it is considerably smaller and is oval in shape, rather than circular. The small size and the dense concentration of charcoal and FMR initially suggested that this was a nondomestic feature--a very large roasting oven or a sweat lodge. However, the botanical analysis shows that the wood consists almost entirely of modified planks and posts, the superstructure of a building, rather than firewood. Interpretation of this as a house is further corroborated by the diverse assemblage of artifacts found on the floor, which resembles those from other house floors. It includes shell artifacts, bone artifacts, a Columbia

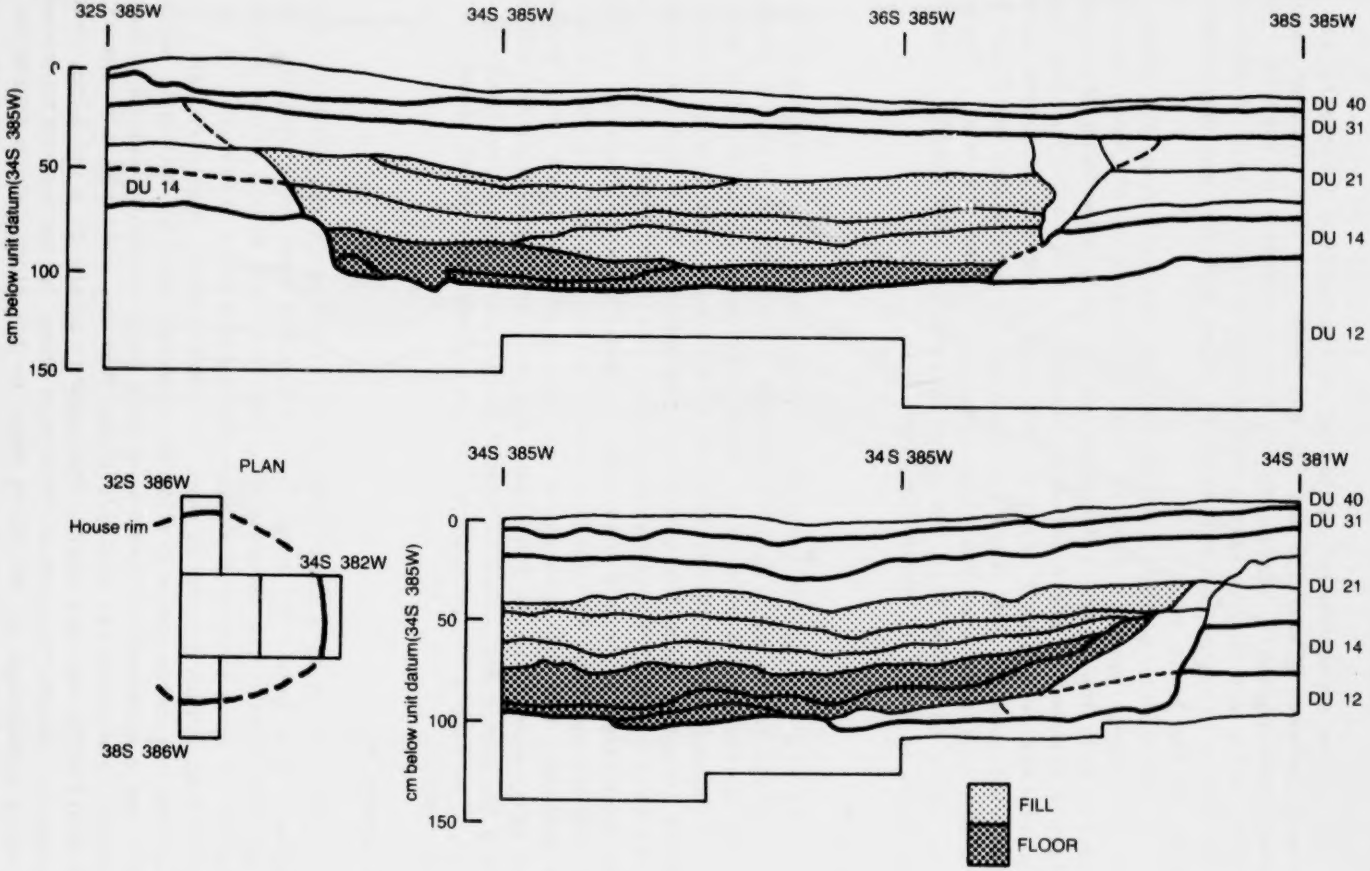
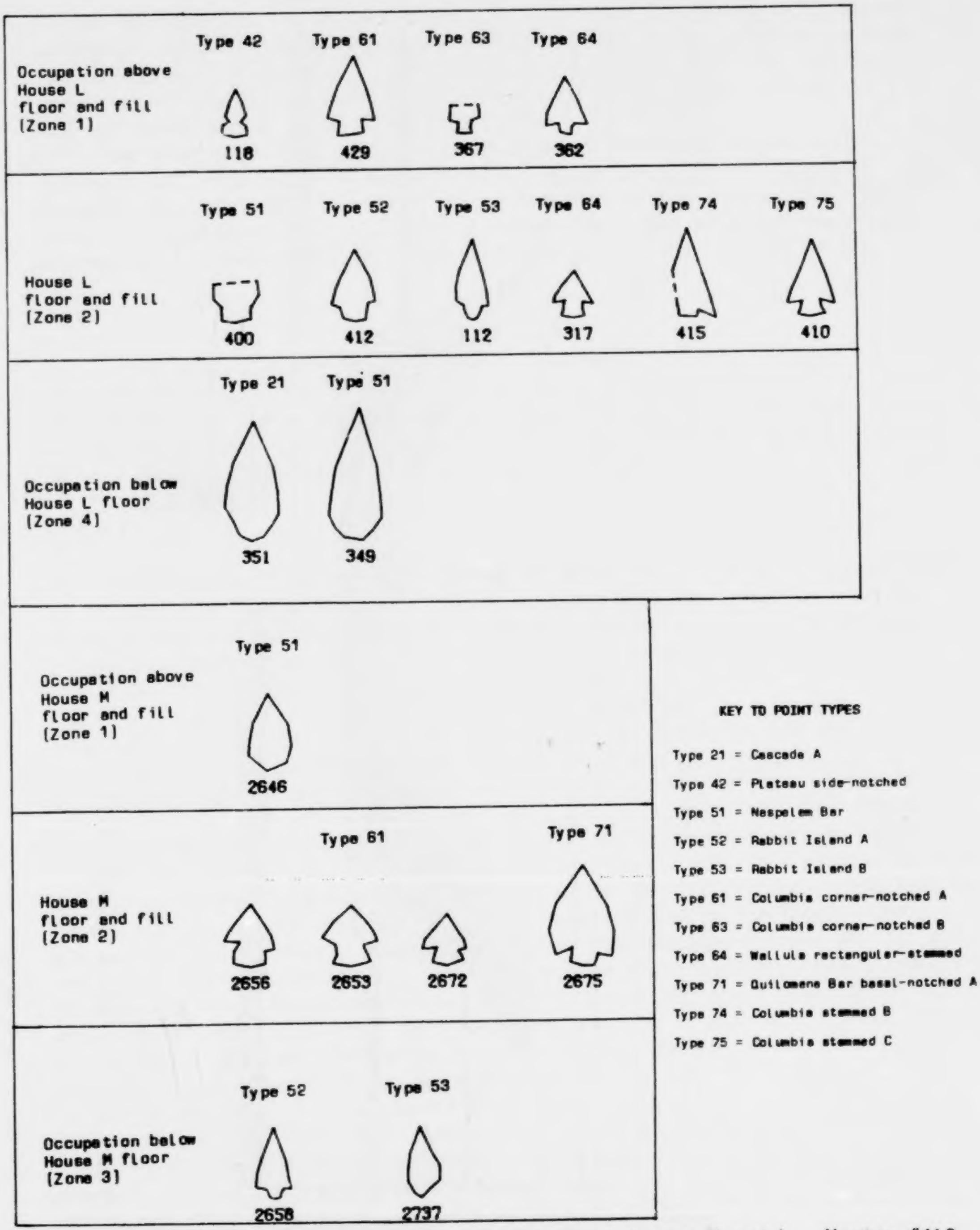

32S 385W
34S 385W
36S 385W
38S 385W
cm below unit datum(34S 385W)
0
50
100
150
DU 14
DU 40
DU 31
DU 21
DU 14
DU 12
PLAN
32S 386W
House rim
34S 382W
38S 386W
34S 385W
34 S 385W
34S 381W
cm below unit datum(34S 385W)
0
50
100
150
DU 40
DU 31
DU 21
DU 14
DU 12
FILL
FLOOR

Figure 7-14. Profile of House L, 45-OK-2.


Occupation above House L floor and fill (Zone 1)
Type 42
118
Type 61
429
Type 63
367
Type 64
362
House L floor and fill (Zone 2)
Type 51
400
Type 52
412
Type 53
112
Type 64
317
Type 74
415
Type 75
410
Occupation below House L floor (Zone 4)
Type 21
351
Type 51
349
Occupation above House M floor and fill (Zone 1)
Type 51
2646
House M floor and fill (Zone 2)
Type 61
2656
2653
2672
Type 71
2675
Occupation below House M floor (Zone 3)
Type 52
2658
Type 53
2737

KEY TO POINT TYPES

Type 21 = Cascade A
Type 42 = Plateau side-notched
Type 51 = Nespelem Bar
Type 52 = Rabbit Island A
Type 53 = Rabbit Island B
Type 61 = Columbia corner-notched A
Type 63 = Columbia corner-notched B
Type 64 = Wallula rectangular-stemmed
Type 71 = Quilomene Bar basal-notched A
Type 74 = Columbia stemmed B
Type 75 = Columbia stemmed C

Figure 7-15. Projectile points from excavation of Houses M and L. Master #412 House L is from a unit which is 75% floor and 25% Zone 3 below the house.

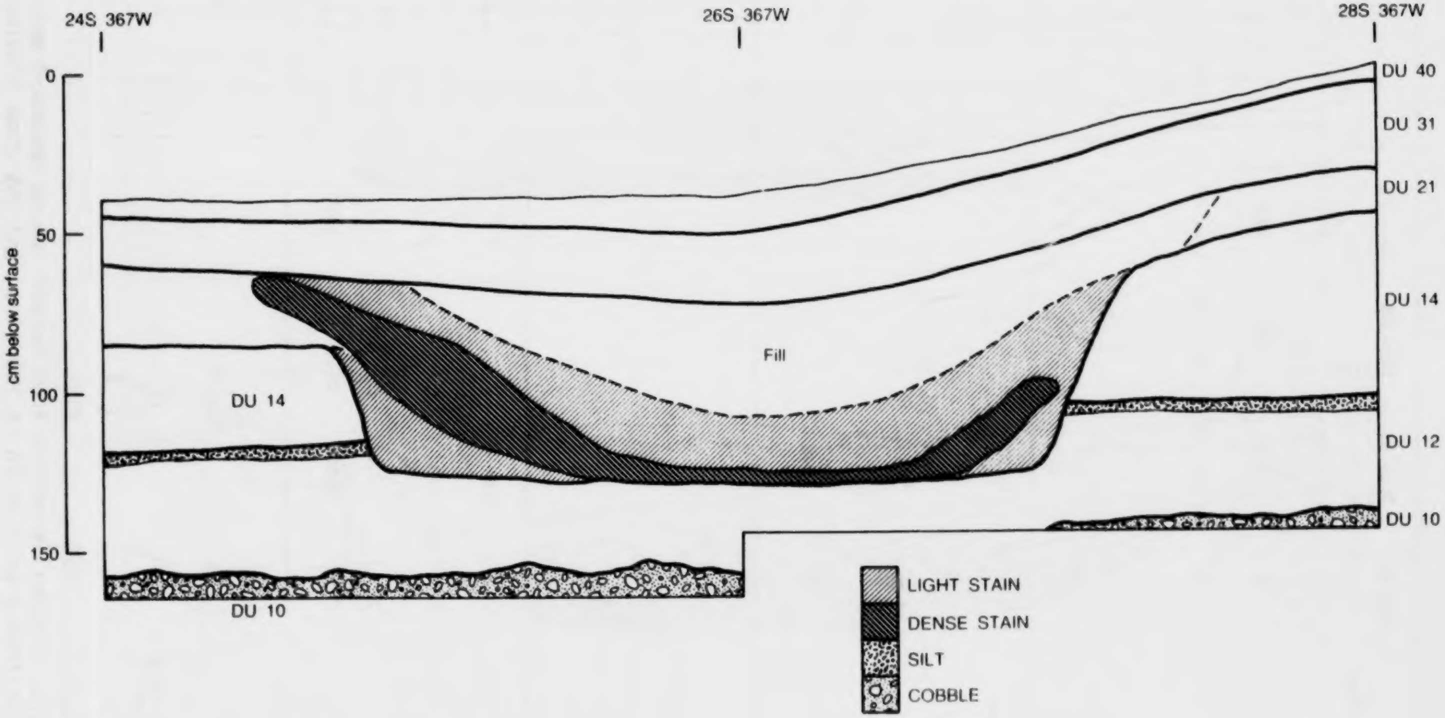

24S 367W
26S 367W
28S 367W
0
50
100
150
cm below surface
DU 40
DU 31
DU 21
DU 14
DU 12
DU 10
Fill
DU 14
DU 10
LIGHT STAIN
DENSE STAIN
SILT
COBBLE

Figure 7-16. Profile of House N.

Corner-notched B point, a chokecherry pit, firewood charcoal, and a wooden artifact. Nonetheless it resembles no other house at this site or recorded in the ethnographic literature. The small size and suite of woods used in construction are appropriate for a summer lodge, (see Chapter Five), but these are not described as being semisubterranean.

The only postmold recorded is just outside the walls to the south (Feature 68). The large number of posts inside the structure suggest, however, that the roof was supported by internal as well as external posts. Many of the planks are only partially carbonized. The house may have been dismantled for use at another time, with the planks laid in the bottom.

ZONE 1

Three large surface structures are assigned to Zone 1. Because of the large excavation blocks in Housepit 6 and Surface Depressions E and F, we analyze activity areas and artifact distributions in detail for these houses and adjacent areas. Occupation surfaces encountered in the upper strata of several housepit depressions may also be structures.

House 6

Osborne recorded a surface depression measuring 6.6 m in diameter and 40 cm in depth as Housepit 6, but did not excavate it. We excavated a large block in the depression, revealing a shallow surface structure rather than a pit-house. Associated artifacts and radiocarbon dates place the occupation of the structure in protohistoric or historic times.

The structure is rectangular in plan and approximately 10 x 5 m, with its long axis oriented east-west along the river (Figure 7-17). The walls are steep, but only 20 cm deep. A low ridge of soil approximately as high as the surrounding surface divided the eastern third from the western two-thirds of the structure. The structure is overlain by a 10-20 cm thick flood deposit which may be from the 1894 flood. An occupation below the house is dated between 500 and 600 B.P. The radiocarbon date of 110 B.P. (too modern to be dendro-corrected) obtained from the floor agrees well with these bracketing dates, and with the diagnostic materials associated with the floor. The projectile points consist almost entirely of Plateau Side-notched points, as well as a Nespelem Bar and two Quilomene Bar Basal-notched A points (Figure 7-18). Historic artifacts associated with the floor include a blue Canton bead and a white seed bead--types of trade beads circulated between 1800 and 1830 A.D--a copper pin, and two scraps of rusty metal. Because they occur below the 1894 flood deposit, their association with the floor is undoubted. There is little evidence of later historic activity in this area so there is equally little possibility that their presence is due to disturbance. Only a single historic artifact--a galvanized metal handle--was found above the flood deposit. In sum, the historic artifacts, projectile points, radiocarbon dates, and stratigraphy all indicate occupation of the structure between 1800 and 1830.

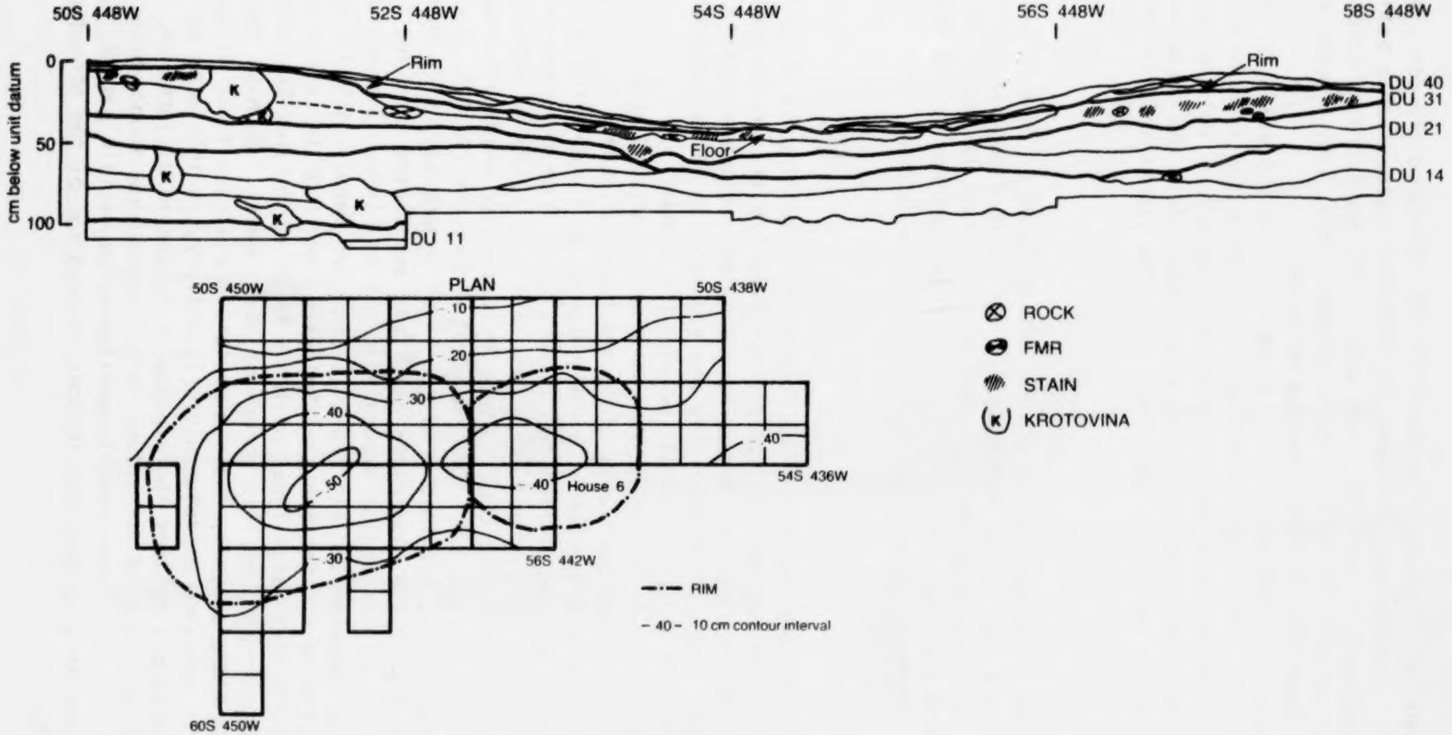
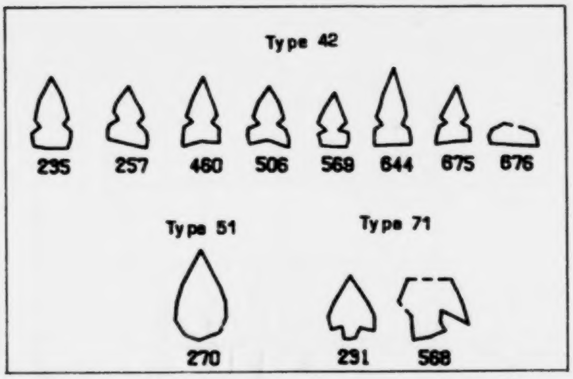

50S 448W
52S 448W
54S 448W
56S 448W
58S 448W
cm below unit datum
0
50
100
Rim
Rim
Floor
K
DU 40
DU 31
DU 21
DU 14
DU 11
PLAN
50S 450W
50S 438W
54S 436W
56S 442W
60S 450W
.10
.20
.30
.40
.50
House 6
⊗ ROCK
FMR
STAIN
(K) KROTOVINA
RIM
- 40 - 10 cm contour interval

Figure 7-17. Plan and profile of House 6, 45-OK-2.



KEY TO POINT TYPES

Type 42 = Plateau side-notched

Type 51 = Nespelem Bar

Type 71 = Quilomene Bar basalt-notched A

Figure 7-18. Projectile points from House 6, Zone 1, 45-OK-2.

Because this protohistoric house is well preserved and extensively excavated, it merits a detailed discussion of artifact distributions and activity areas. We examine the distribution of artifacts, features, faunal remains, and FMR in and about the structure, and define activity areas.

Figure 7-19 illustrates the distribution of high density areas of lithics, bone, shell, and FMR. All the materials have highly clustered distributions at a scale less than 1 x 1 m: less than 10% of the units contain 30% of the material in each case. They are also clustered at a scale larger than 1 x 1 m, and seem to have a patterned distribution relative to the entire structure and the internal features. The high density bone quads are all contiguous and lie outside the structure, suggesting a butchering area. Lithics occur in three smaller areas covering two, three, and three quads. This distribution suggests separate activity areas belonging to different family groups using the structure. A cluster of FMR covers five quads in the center of the structure in the vicinity of Feature 122, an oven, and Feature 95, a hearth. Because the FMR area crosses the ridge which seems to divide the structure, we assume that only one structure is represented. Near the walls at opposite ends of the structure, two smaller concentrations of FMR occur. The lack of FMR concentrations in the vicinity of oxidized soil Features 88 and 90 suggests that these are former hearth locations no longer in use at the time of the Zone 1 occupation. Shell is the most clustered of all the types of refuse examined here: three quads alone contain 30% of all the shell. One is located adjacent to Feature 122, the other two are near each other at the western end of the structure. The only area of overlap between high density deposits of lithics, shell, and FMR lies on the northeast edge of Feature 122, suggesting that it may be a general activity or food preparation area.

By examining the distribution of artifact types, we can corroborate some of these inferences. The distribution of bifaces, projectile points, and projectile point fragments is shown in Figure 7-20. Projectile points occur in scattered locations inside the structure; almost as many occur in a cluster outside the structure to the east. Tip and base fragments, on the other hand, occur more frequently inside the structure. The bifaces occur both inside and outside of the feature, but more commonly inside. These are probably

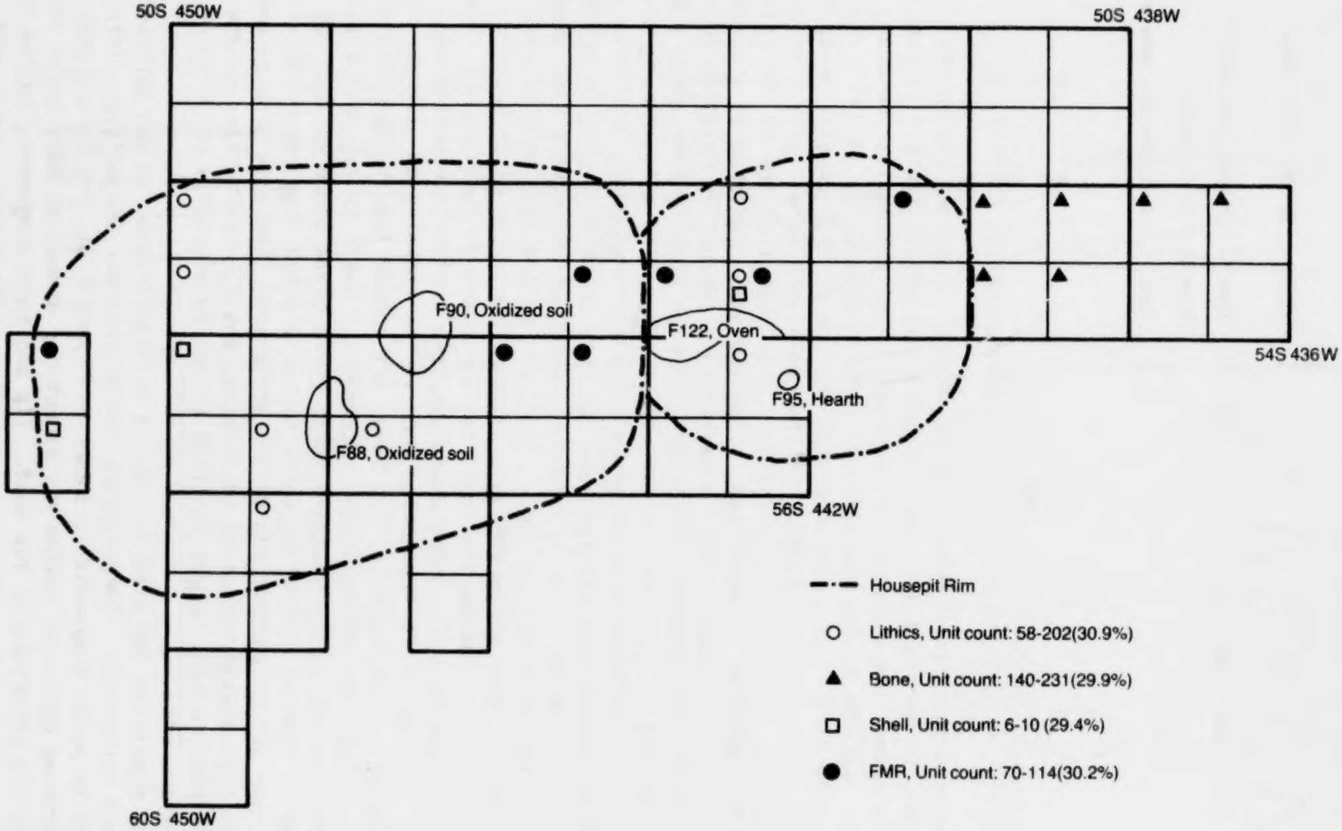

50S 450W
50S 438W
54S 436W
56S 442W
60S 450W
F90, Oxidized soil
F88, Oxidized soil
F122, Oven
F95, Hearth
Housepit Rim
Lithics, Unit count: 58-202(30.9%)
Bone, Unit count: 140-231(29.9%)
Shell, Unit count: 6-10 (29.4%)
FMR, Unit count: 70-114(30.2%)

Figure 7-19. Distribution of lithics, bone, shell and FMR concentrations, House 6, 45-OK-2.

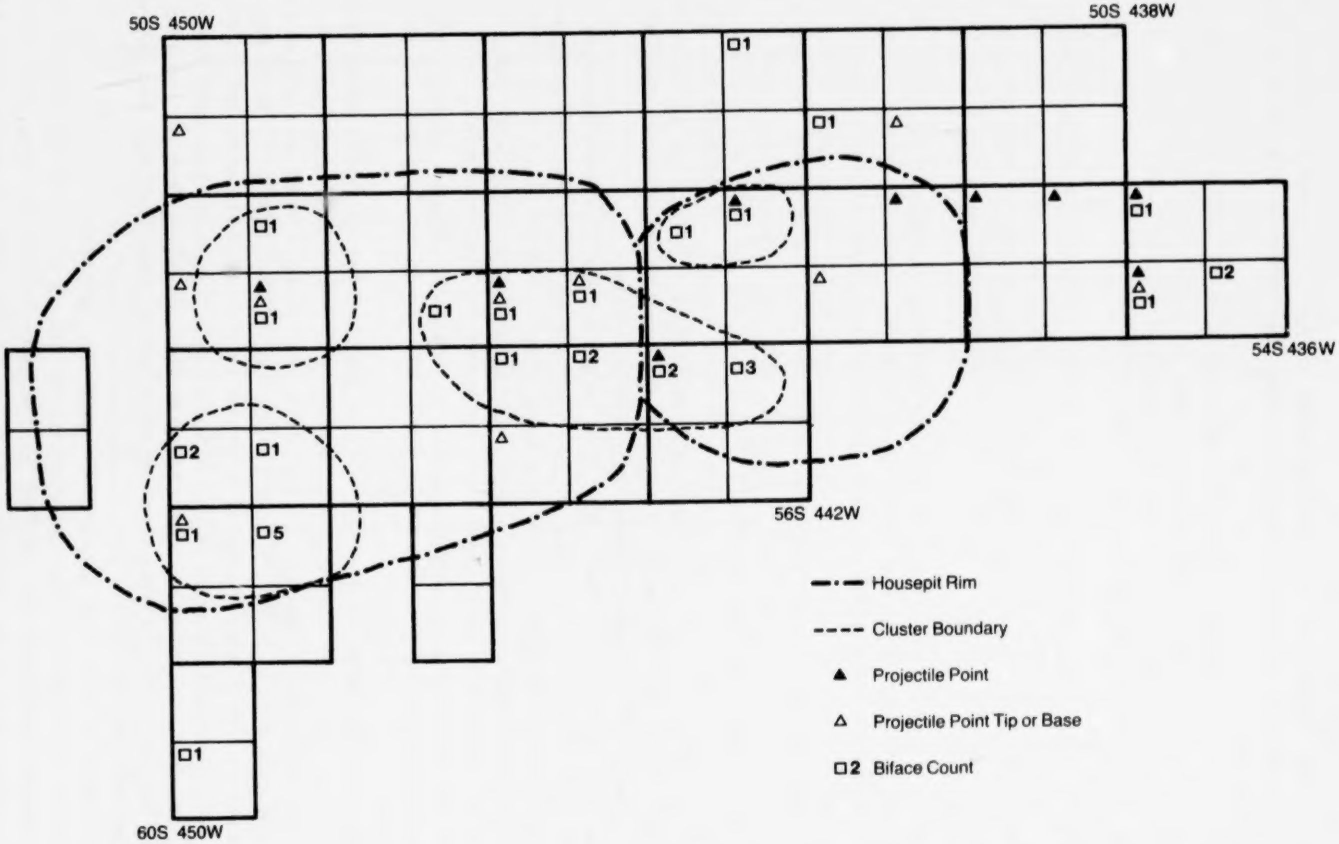

50S 450W
50S 438W
54S 436W
56S 442W
60S 450W
Housepit Rim
Cluster Boundary
Projectile Point
Projectile Point Tip or Base
□2 Biface Count

Figure 7-20. Distribution of bifaces and projectile points (including fragments) in House 6, 45-OK-2.

manufacturing fragments, indicating areas where lithic manufacturing took place. Inside the structure there are four discernable clusters of these artifact types.

The distribution of bifacially and unifacially retouched flakes, scrapers, gravers, and resharpening flakes is shown in Figure 7-21. These artifacts indicate not lithic manufacturing, but small construction of items of bone, wood, and other material. They form two clusters at opposite ends of the structure.

Figure 7-22 illustrates the distribution of utilized flakes and tabular knives. These are more numerous and more scattered than other artifact types examined thus far. Tabular knives occur in roughly equal numbers inside and outside the house, and tend to be closely associated with utilized flakes in both areas.

Cobble tools have yet a different distribution, occurring most commonly outside the structure to the north (Figure 7-23). Inside the structure are one amorphously flaked cobble, two hammerstones, and two (possibly three) choppers.

Historic materials, ornaments, and bone tools are shown in Figure 7-24. The ground steatite pendant and fragment, and the two harpoon valve fragments occurring in quads on the border of the structure were actually found within the boundary. Except for the ground steatite object in 59S450W and the bead fragment in 50S450W, the ornaments and decorated objects all occur within the structure. They tend to occur along the rim of the structure, suggesting that storage areas for valuable items are located there.

The overlap between these various distributions defines a number of distinct activity areas (Figure 7-25). Butchering apparently was done outside the structure to the east, where the bone concentration coincides with a concentration of cutting tools useful for butchering. The four complete projectile points may have been left imbedded in the carcasses. The hammerstone and anvil in the two quads to the north may be associated either with the bone complex or with the complex of cobble tools north of the structure.

Outside the house to the north is a distinctive grouping of artifacts--cobble tools, utilized flakes, tabular knives, a few bifaces, and a cluster of bifacially retouched flakes. Unifacially retouched flakes and projectile points and projectile point fragments are found less commonly here than in other areas. The predominance of bifacially retouched flakes and bifaces over unifacially retouched flakes suggests cutting and sawing was done here; the anvils, chopper, and hammerstone indicate that pounding was an important activity as well. All this points to the use of the area for the processing of plants for food.

Artifacts within the house also occur in patterned distributions. We have already pointed out the association of valuables with the house walls, the extensive concentration of FMR in the central hearth area, and the more limited food preparation area associated with the oven in which high densities of bone, FMR, shell and lithics coincide. The lithic areas at each end of the structure associated with hearths are manufacturing areas for nonlithic materials. There are as well the clusters of lithics which occur in each

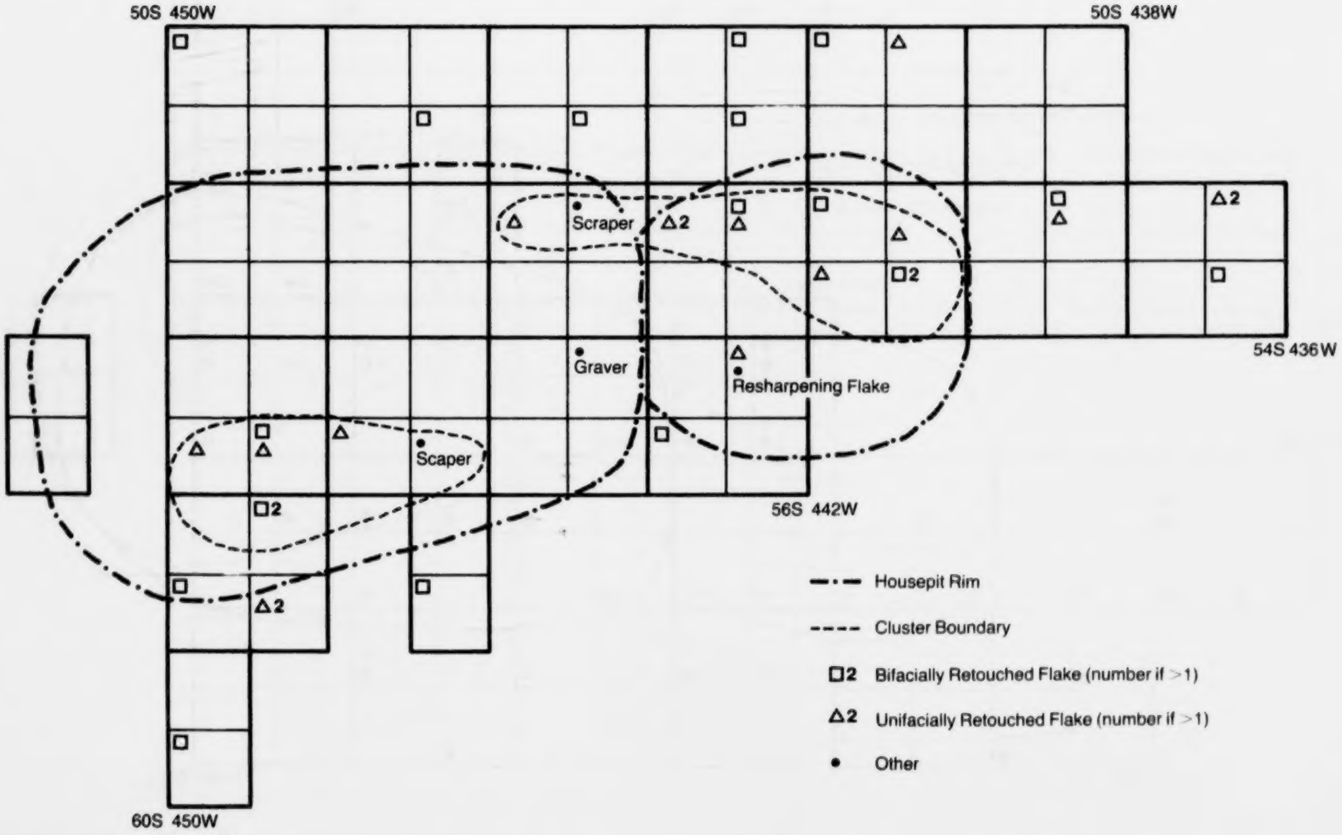

50S 450W
50S 438W
54S 436W
56S 442W
60S 450W
□2
Δ2
Scraper
Graver
Resharpening Flake
Scaper
Housepit Rim
Cluster Boundary
□2 Bifacially Retouched Flake (number if >1)
Δ2 Unifacially Retouched Flake (number if >1)
• Other

Figure 7-21. Distribution of bifacially retouched flakes, unifacially retouched flakes, scrapers, resharpening flakes, and gravers, House 6, 45-OK-2.

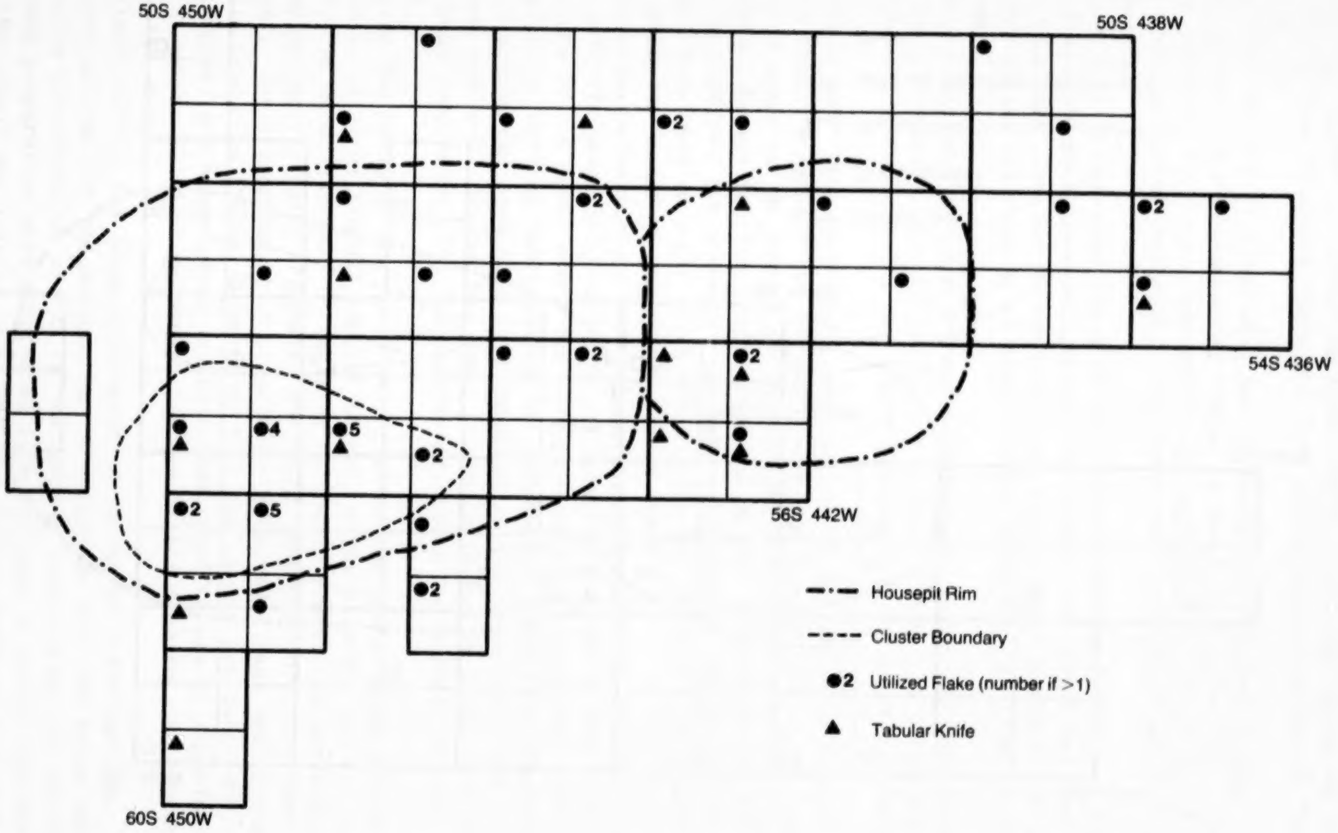

50S 450W
50S 438W
54S 436W
56S 442W
60S 450W
Housepit Rim
Cluster Boundary
●2 Utilized Flake (number if >1)
▲ Tabular Knife

Figure 7-22. Distribution of utilized flakes and tabular knives, House 6, 45-OK-2.

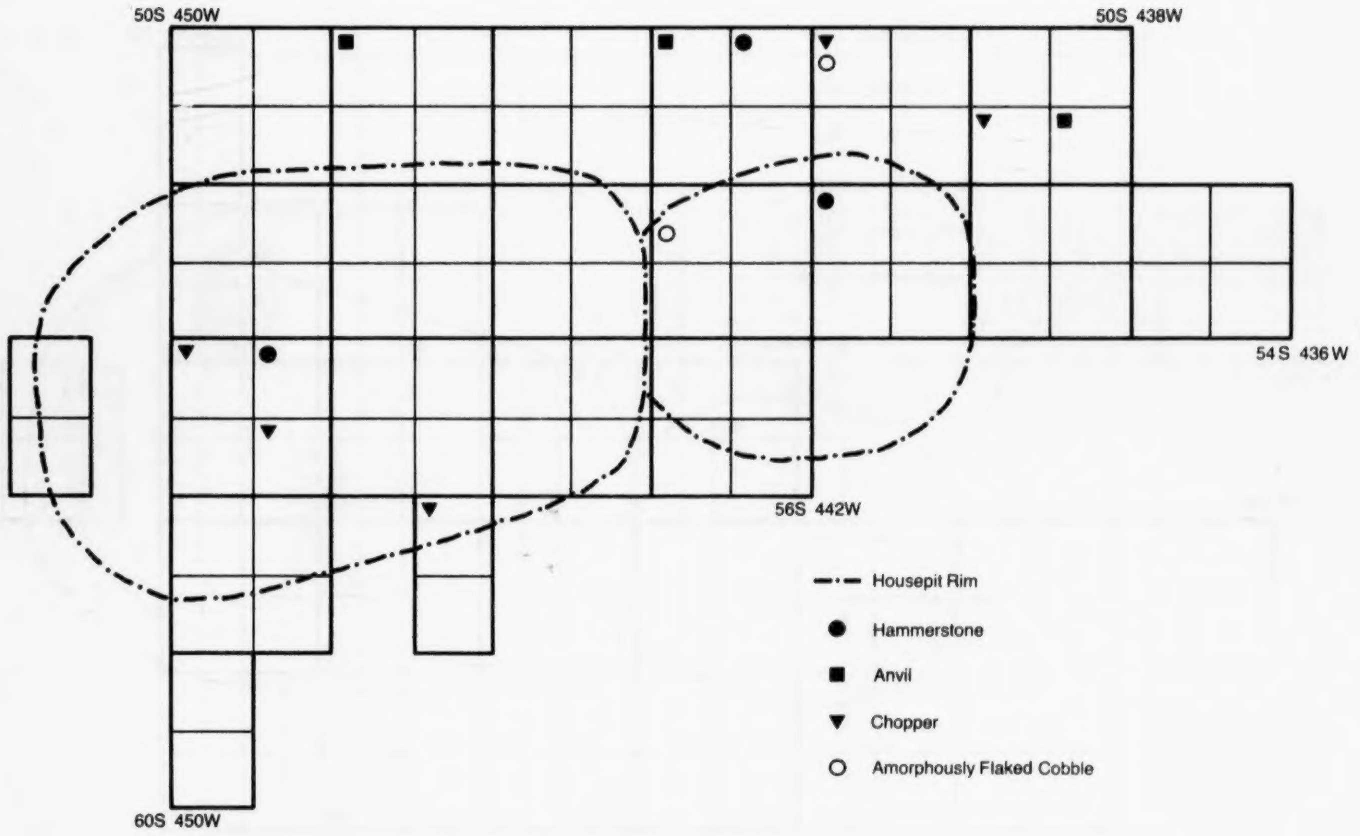

50S 450W
50S 438W
54 S 436 W
56S 442W
60S 450W
Housepit Rim
● Hammerstone
■ Anvil
▼ Chopper
○ Amorphously Flaked Cobble

Figure 7-23. Distribution of cobble tools, House 6, 45-OK-2.

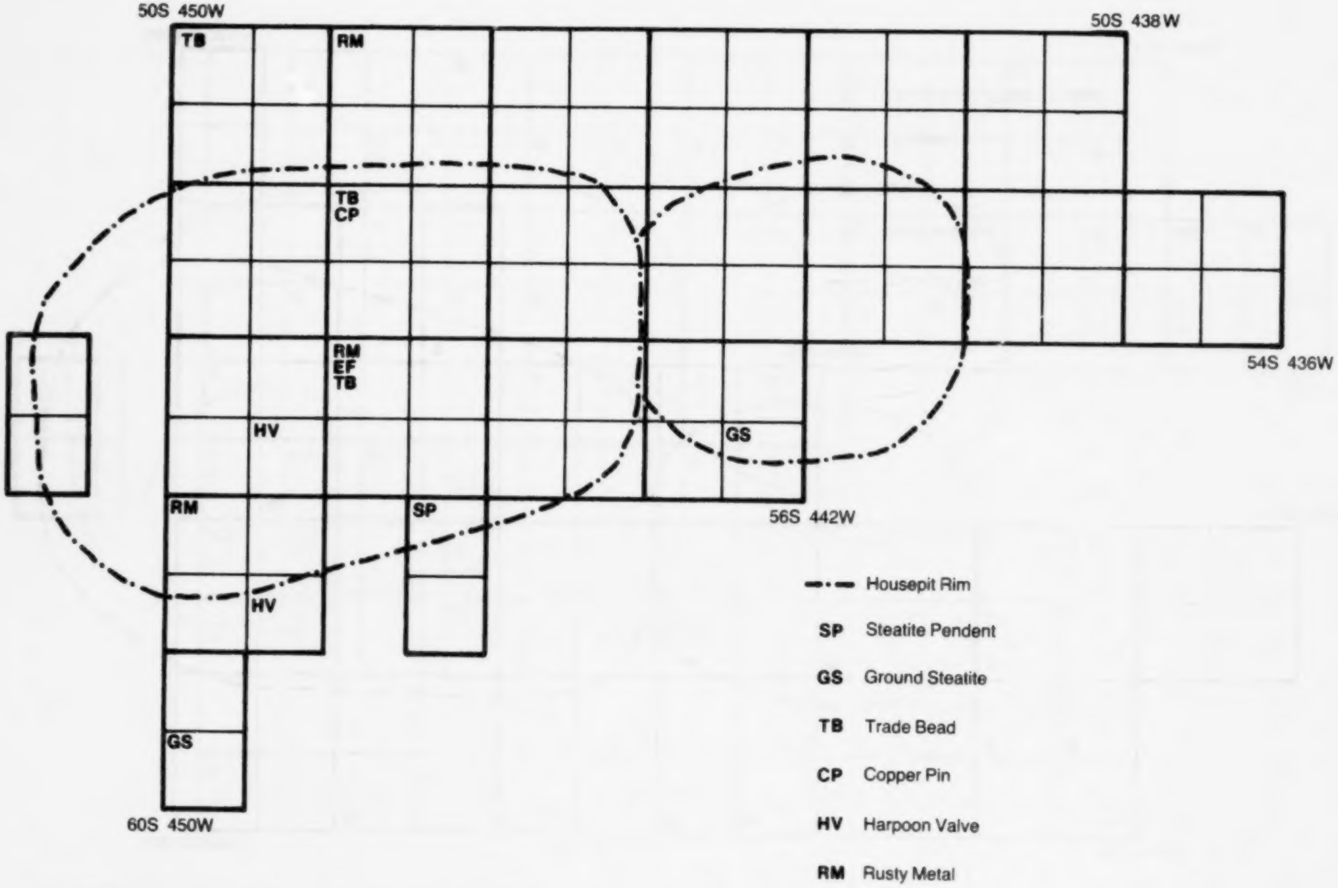

50S 450W
50S 438W
54S 436W
56S 442W
60S 450W
TB
RM
TB
CP
RM
EF
TB
HV
GS
RM
SP
HV
GS
Housepit Rim
SP Steatite Pendent
GS Ground Steatite
TB Trade Bead
CP Copper Pin
HV Harpoon Valve
RM Rusty Metal

Figure 7-24. Distribution of ornaments, historic items, and bone tools, Zone 1, Housepit 6, 45-OK-2.

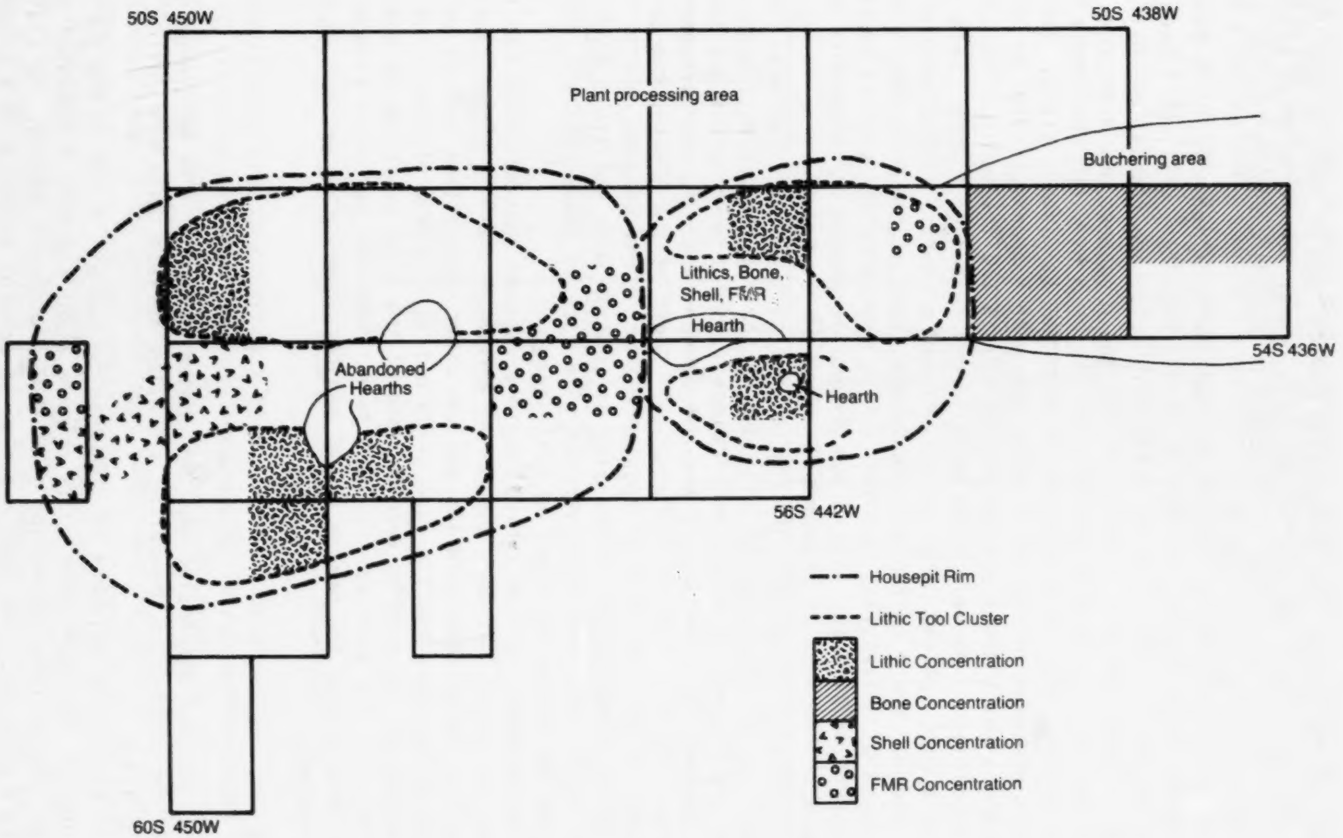

50S 450W
50S 438W
Plant processing area
Butchering area
Lithics, Bone, Shell, FMR
Hearth
Hearth
Abandoned Hearths
54S 436W
56S 442W
60S 450W
Housepit Rim
Lithic Tool Cluster
Lithic Concentration
Bone Concentration
Shell Concentration
FMR Concentration

Figure 7-25. Schematic of materal concentrations and activity areas, House 6, 45-OK-2.

quadrant of the house; the distinctive composition of each is decribed below. These are interpreted as general activity areas; the differences between the areas may reflect functional differences or economic specialization of families occupying each quadrant.

The greatest numbers of worn and manufactured tools occur in the southwestern area, where clusters of lithic debitage, utilized flakes and tabular knives, unifacially and bifacially retouched flakes, and bifaces overlap. Three choppers, a hammerstone, and a scraper are also associated. This assemblage suggests a general activity area in which manufacturing of nonlithic materials and processing of food may have taken place. The cluster of lithic debitage to the north coincides with a sparse scatter of utilized flakes and a few bifaces and projectile points and fragments. The cluster lacks cobble tools as well as bifacially and retouched flakes. This area was used for a more limited range of activities, primarily lithic manufacturing. Only a scraper and a unifacially retouched flake at the east margin suggest other types of activities. Another lithic manufacturing area is represented by a cluster of bifaces, with a few projectile points and fragments and other artifacts in the area of abundant FMR west of the hearth.

Two clusters also occur in the eastern part of the structure. North of the hearth is an area of bifacially and unifacially retouched flakes, a few bifaces and projectile points and fragments, and a hammerstone and amorphously flaked cobble. Utilized flakes are not common here. This area appears to have been used for lithic manufacturing. South of the hearth, the co-occurrence of utilized flakes, tabular knives, a few bifaces, and a resharpening flake suggest processing of food or some nonlithic materials. An area of high lithic debitage overlaps with each of these clusters, but they represent two different kinds of activities.

The redundancy of the lithic clusters suggest that at least two families occupied the house. At each end of the structure are two lithic clusters, one representing lithic manufaturing and the other generalized activities. The presence of multiple hearths also bears out this interpretation. The significance of the cleared hearths, and of the high densities of shell recovered from the west wall is uncertain. The association of bifaces with the FMR area around the hearth is yet another interesting pattern of uncertain significance.

House E

This surface depression was designated by CJDCRP. We excavated a large block in the depression, revealing a shallow surface structure dating from historic times.

The structural evidence is somewhat confusing. A map of the surface elevations of the excavation units (Figure 7-26) suggests a somewhat different shape for the surface depression than that previously mapped. No distinct walls were observed. The most definite structural evidence is a circular floor (Feature 4) which straddles the southwestern rim of the surface depression. Underlying the floor were the carbonized remains of a mat. The thin (less than 1 cm) sheet of densely concentrated flat pieces of charcoal

(Feature 66) covered an area approximately 1 m by 2.5 m. They were separated in some areas by a few centimeters of sterile, silty sand, but in the southern extent Feature 4 directly overlay Feature 66. Whether the circular area of Feature 4 represents a single structure, or is part of a larger structure coinciding with the surface depression is unclear. The following analysis suggests is that it is a rectangular structure 8 x 6 m and oriented east-west with its long axis parallel to the river.

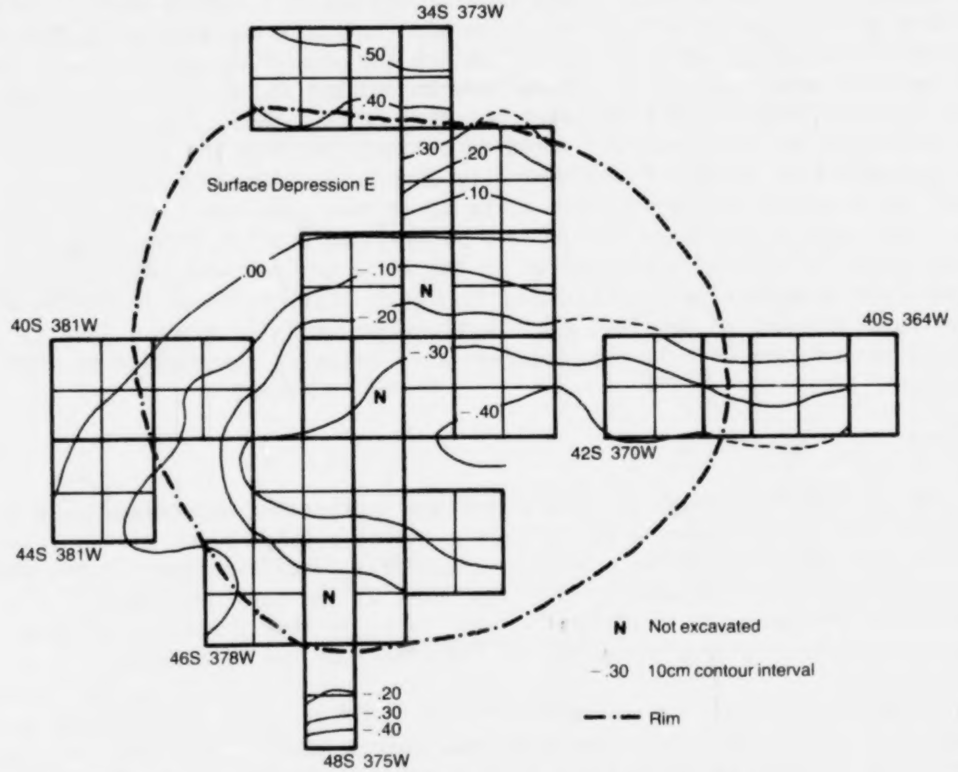

34S 373W
.50
.40
.30
.20
.10
Surface Depression E
.00
-.10
N
-.20
-.30
N
-.40
40S 381W
40S 364W
42S 370W
44S 381W
N
46S 378W
-.20
-.30
-.40
48S 375W
N Not excavated
-.30 10cm contour interval
Rim

Figure 7-26. Plan view of Surface Depression E, 45-OK-2.

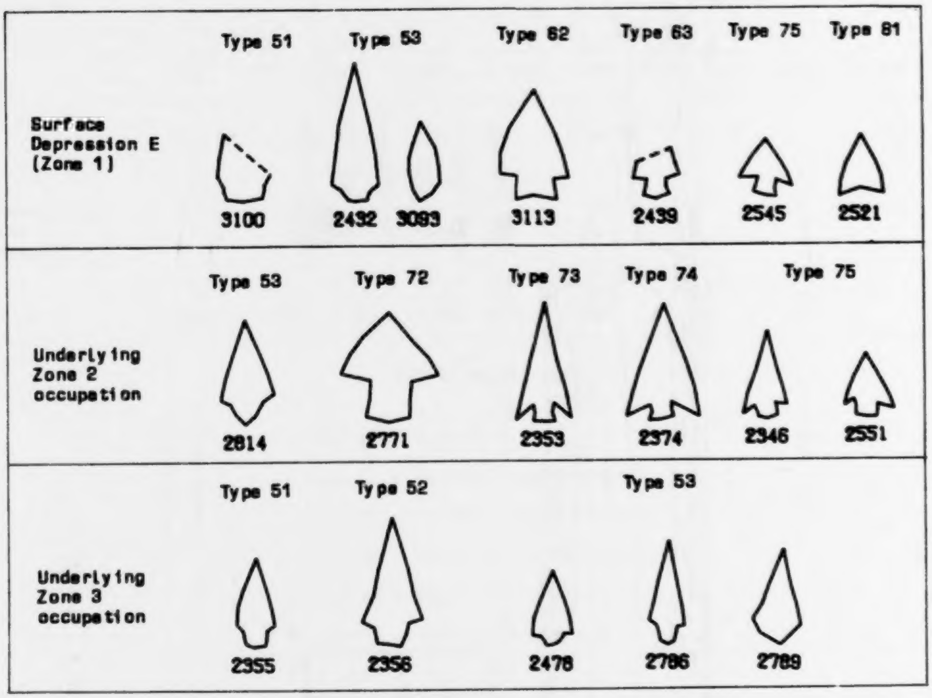
The structure is overlain by a 10-20 cm of flood deposits, the same historic flood deposit that overlies Housepit 6. A radiocarbon date of 196±70 B.P. was obtained from Feature 4. The historic artifacts are much more numerous and diverse than in Housepit 6. While the trade beads--a burned black Canton bead, a Cornaline d'Aleppo bead, and one half of a blue Canton bead--the square nails and the staff button could date from the early fur trade period (1800-1830), the majority of the items date from after 1850. These include a military button modified into a tinkler, sherds of a patent medicine bottle, a powder flask, a brass buckle with the patent date 1856 marked on it, and two cans. There is little problem with contamination by later historic activities. A lock washer found in UL 0 is the single later historic artifact. The others all could have been in use before 1900.

The projectile points recovered from this structure (Figure 7-27) are stylistically diverse and are not useful for chronological placement of the structure. They include a Nespelem Bar, two Rabbit Island B, and a Quilomene Corner-notched, points which are commonly associated with Hudnut phase assemblages. The Columbia Corner-notched B and Columbia Stemmed B, on the other hand, are typical late points. This assemblage contrasts radically with the assemblages from Housepit 6 and Surface Depression F, which contain very uniform assemblages of late points. The most probable explanation is that by this time the use of stone projectile points had almost ceased entirely. Guns may have replaced bows and arrows to some extent and those arrows still being used may have been tipped with metal points. If this is so, the points from the structure may have been collected as curiosities from the nearby beach. If, however, they were still occasionally manufactured or were retained by older individuals, stylistic constraints would have been less stringent. In sum, the historic artifacts, projectile points, radiocarbon dates, and stratigraphy all indicate occupation of the structure between 1850 and 1894. Because of the extensive excavation of this protohistoric house it merits a detailed discussion of artifact distributions and activity areas. This is done in conjunction with Surface Depression F following description of that stucture.

House F

We designated a roughly circular surface depression, approximately 8 m in diameter, as Surface Depression F. Excavation of a large block within this surface depression indicated a shallow circular surface structure of the same dimensions. It is truncated by the river bank at the southern rim. Associated artifacts and radiocarbon dates indicate that the structure was occupied in protohistoric times and is the oldest of the three Zone 1 structures.

Constructed walls are not apparent, but the floor area is marked by dark staining (Figure 7-28). Like the other two Zone 1 houses, the floor is overlain by a 10-20 cm thick flood deposit which is assumed to be from the 1894 flood. A radiocarbon date of 227±80 B.P. was obtained from the floor. Plateau Side-notched, Columbia Corner-notched A, and Columbia Corner-notched B projectile points were found (Figure 7-29). Although the points are assigned to different historic types, they are very similar in size and shape. Even the side-notched and corner-notched forms of this assemblage overlap morphologically. Historic artifacts include two copper spacer beads and six copper scraps. Later historic artifacts, including rubber scraps, brown bottle sherds, and a bottle cap, occur in higher levels above the flood deposits and are not associated with the floor. A lead slug and two pieces of scrap ferrous metal may or may not be associated. As copper was one of the earliest Euroamerican items to be circulated, and as no beads were found in this house, this assemblage of trade items suggests that occupation ended before 1800. In sum, the radiocarbon date, projectile points, and historic items suggest occupation between 1650 and 1800.


Type 51
Type 53
Type 62
Type 63
Type 75
Type 81
Surface Depression E (Zone 1)
3100
2432
3093
3113
2439
2545
2521
Type 53
Type 72
Type 73
Type 74
Type 75
Underlying Zone 2 occupation
2814
2771
2353
2374
2346
2551
Type 51
Type 52
Type 53
Underlying Zone 3 occupation
2355
2356
2478
2786
2789

KEY TO POINT TYPES

Type 51 = Nespelem Bar

Type 52 = Rabbit Island A

Type 53 = Rabbit Island B

Type 62 = Quilomene Bar corner-notched

Type 63 = Columbia corner-notched B

Type 72 = Quilomene Bar basal-notched B

Type 73 = Columbia stemmed A

Type 74 = Columbia stemmed B

Type 75 = Columbia stemmed C

Type 81 = untyped

Figure 7-27. Projectile points from excavation of House E, 45-OK-2.

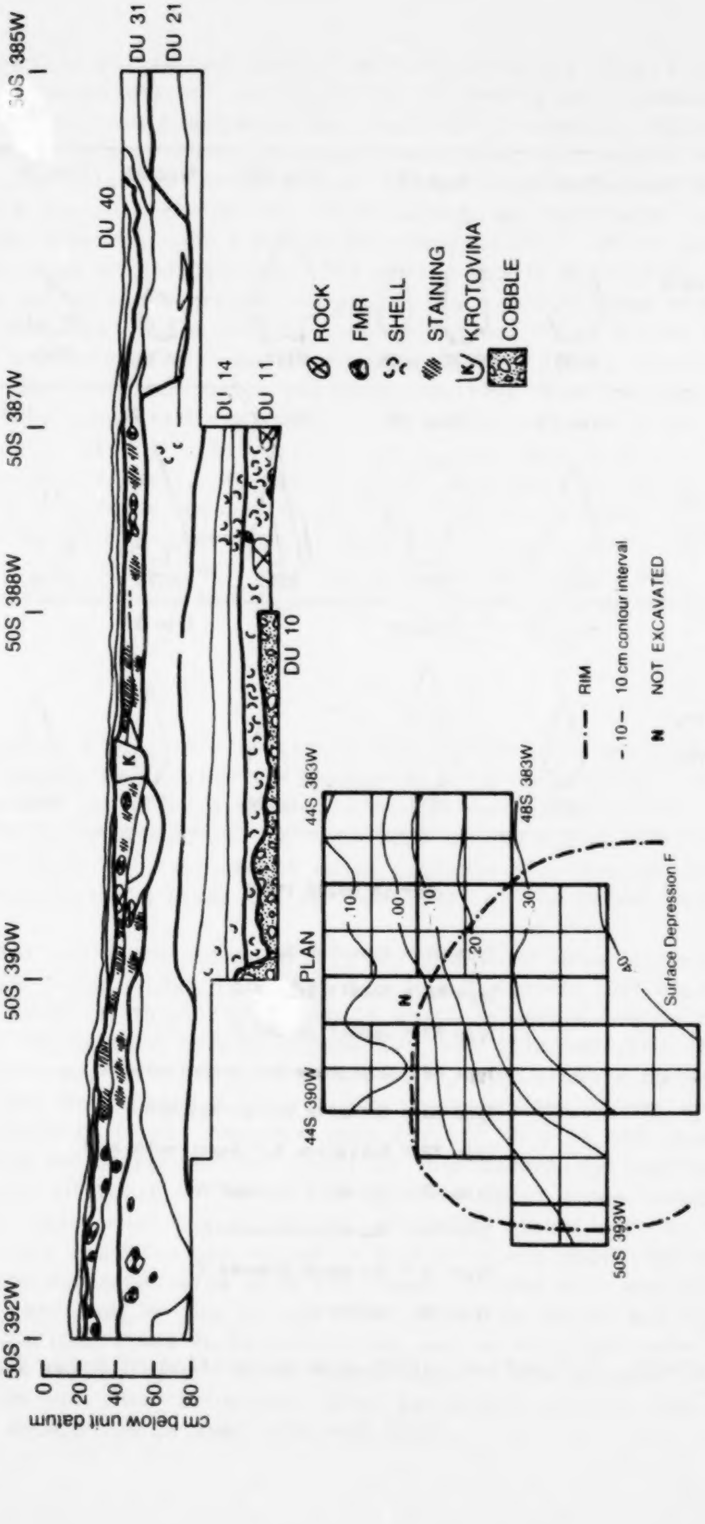
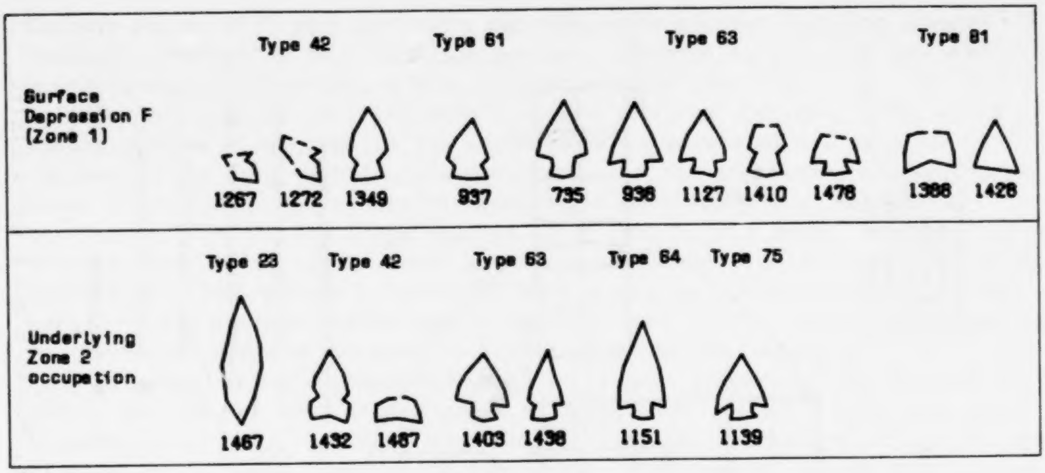

cm below unit datum
0
20
40
60
80
50S 392W
50S 390W
50S 388W
50S 387W
50S 385W
DU 31
DU 21
DU 40
DU 14
DU 11
DU 10
K
ROCK
FMR
SHELL
STAINING
KROTOVINA
COBBLE
PLAN
44S 390W
44S 383W
48S 383W
50S 393W
.10
.00
.10
20
30
40
N
Surface Depression F
RIM
10 cm contour interval
N NOT EXCAVATED

Figure 7-28. Plan and profile views of House F, 45-OK-2.


Type 42
Type 61
Type 63
Type 81
Surface Depression F (Zone 1)
1267
1272
1349
937
735
936
1127
1410
1478
1388
1428
Type 23
Type 42
Type 63
Type 64
Type 75
Underlying Zone 2 occupation
1467
1432
1487
1403
1438
1151
1139

KEY TO POINT TYPES

Type 23 = Cascade C

Type 42 = Plateau side-notched

Type 61 = Columbia corner-notched A

Type 63 = Columbia corner-notched B

Type 64 = Wallula rectangular-stemmed

Type 75 = Columbia stemmed C

Type 81 = untyped

Figure 7-29. Projectile points from excavation of House F, 45-OK-2.

Because this protohistoric house is well preserved and extensively excavated, it merits a detailed discussion of artifact distributions and activity areas. Although the Surface Depression E and F houses were not excavated as completely as Housepit 6, a larger adjacent area was excavated. Here we will examine the distribution of artifacts, features, faunal remains, and FMR in and about the structure, and define activity areas.

Figure 7-30 illustrates the distribution of high density areas of lithics, bone, shell, and FMR in relation to the outlines of the structures and the location of features. All the materials have highly clustered distributions at a scale less than 1 x 1 m--as less than 10% of the units contain 30% of the material in each case. They are also clustered at a scale larger than 1 x 1 m, and seem to have a patterned distribution relative to the structure and the internal features.

Several patterns are evident. In the center of the surface depression overlying House L is a concentration of lithics, and a slightly wider area of numerous bones. In Surface Depression F, high frequencies of bone and lithics also occur together in association near the center of the structure. They overlap in a single central quad which also yielded large amounts of FMR.

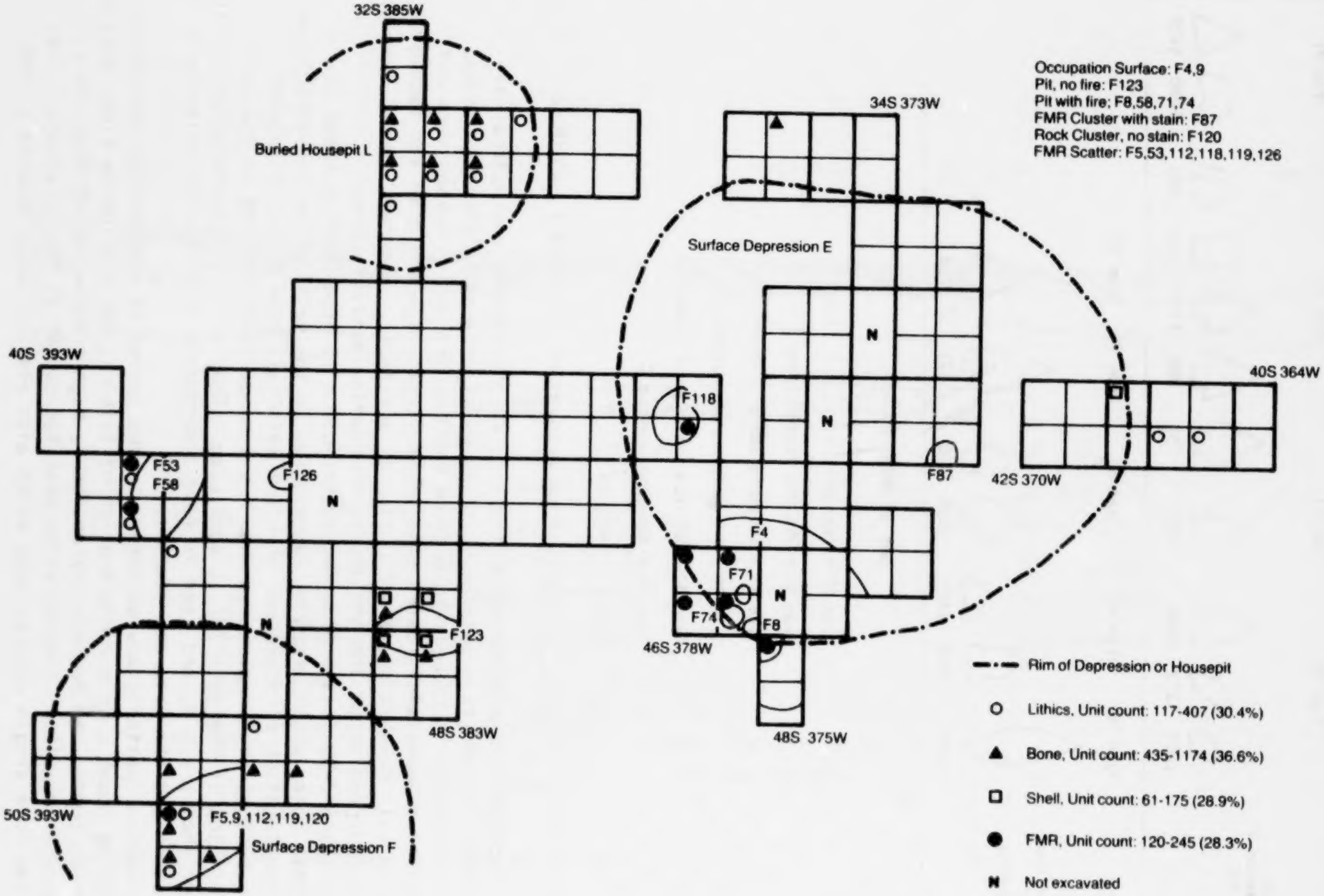

32S 385W
Occupation Surface: F4,9
Pit, no fire: F123
Pit with fire: F8,58,71,74
FMR Cluster with stain: F87
Rock Cluster, no stain: F120
FMR Scatter: F5,53,112,118,119,126
34S 373W
Buried Housepit L
Surface Depression E
N
N
40S 393W
40S 364W
F118
F53
F58
F126
N
F87
42S 370W
F4
F71
N
F74
F8
N
F123
46S 378W
48S 383W
48S 375W
50S 393W
F5,9,112,119,120
Surface Depression F
Rim of Depression or Housepit
○ Lithics, Unit count: 117-407 (30.4%)
▲ Bone, Unit count: 435-1174 (36.6%)
□ Shell, Unit count: 61-175 (28.9%)
● FMR, Unit count: 120-245 (28.3%)
N Not excavated

Figure 7-30. Distribution of lithic, bone, shell, and FMR concentrations, Houses E and F and vicinity, Zone 1, 45-OK-2.

Densely packed with both artifacts and FMR, this cluster included several features: Feature 9, an occupation surface, Features 5, 112, and 119--FMR scatters--and Feature 120, a rock cluster without staining.

Surface Depression E presents a rather different pattern. FMR, which occurs over several quads in the southwestern quadrant of the structure, represents the only high frequency content. In the southwestern area, three ovens (Features 8/11, 71, and 74) associated with the floor (Feature 4) are responsible for the large quantities of FMR in this area. The darkly stained layer which is the floor extends outside the boundaries of the surface depression. The Feature 4 floor may mark a smaller structure built on the margin of the surface depression. A smaller area of FMR concentration occurs to the north, and was recorded as Feature 118, an FMR scatter.

Outside Surface Depression E are single quad concentrations of bone, shell, and FMR, as well as two quads with abundant lithics. Congruent high frequencies of shell and bone occur in the vicinity of Feature 123, a storage pit containing large numbers of fish bones. High numbers of FMR and lithics coincide with the locations of FMR scatter Feature 53, and Feature 58, an oven.

Figure 7-31 illustrates the distribution of projectile points, projectile point fragments, and bifaces in this same area.

The distributions of bifacially and unifacially retouched flakes, scrapers, drill, gravers, and resharpening flakes are shown in Figure 7-32, and Figure 7-33 shows the distribution of utilized flakes and tabular knives. Figure 7-34 shows the distribution of cobble tools.

Ornaments and selected historic artifacts are shown in Figure 7-35. The distribution of both types of artifacts is striking; all but a few occur inside the structures.

The overlap between the distributions shown in the figures defines a number of distinct activity areas (Figure 7-36). The interiors of both Housepit L and Surface Depression F are characterized by central concentrations of lithic debitage and bone, with associated projectile points, bifaces, unifacially retouched flakes, scrapers, gravers, resharpening flakes and utilized flakes, and rarer occurrences of bifacially retouched flakes and tabular knives. Cobble tools are abundant only in Surface Depression F. These are apparently generalized activity areas, including lithic manufacture occurring around the hearths.

Distributions inside Surface Depression E are somewhat different. FMR occurs in large quantities in the southwestern corner without significant associated artifacts. This structure is the only one investigated which did not have the hearth area centrally located. Projectile points occur in a band in the center of the structure, flanked by bifaces, unifacially retouched flakes, and scrapers to the southeast. Bifacially retouched flakes and tabular knives are restricted to the southwestern quadrant, while utilized flakes are widespread. The distribution of ornaments and historic artifacts conforms to the surface depression boundary as drawn. Nails are found around the perimeter, suggesting that they were used in constructing the walls.

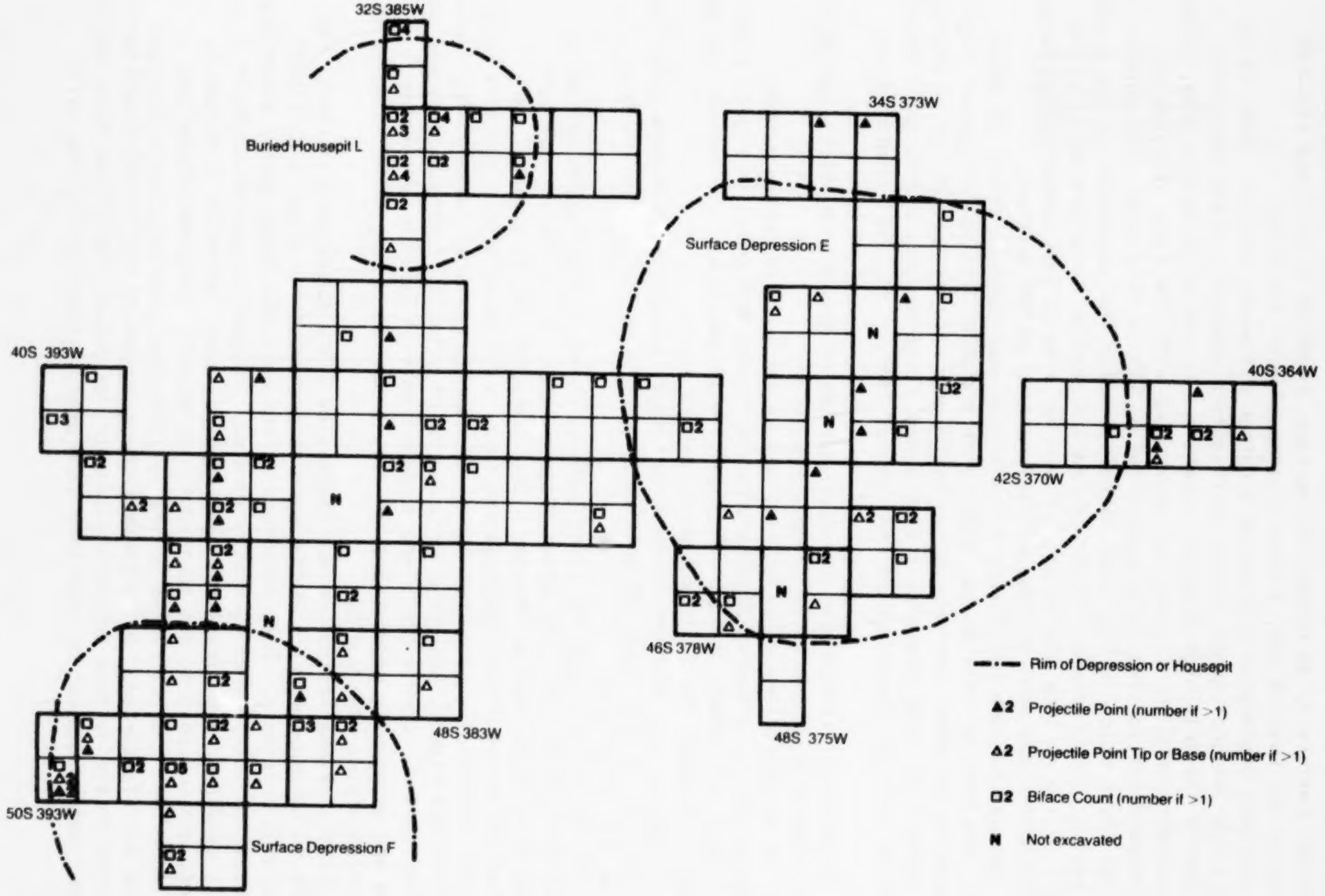

32S 385W
34S 373W
40S 393W
40S 364W
42S 370W
46S 378W
48S 383W
48S 375W
50S 393W
Buried Housepit L
Surface Depression E
Surface Depression F
N
Rim of Depression or Housepit
▲2 Projectile Point (number if >1)
△2 Projectile Point Tip or Base (number if >1)
□2 Biface Count (number if >1)
N Not excavated

Figure 7-31. Distribution of bifaces and projectile points (including fragments), Houses E and F and vicinity, Zone 1, 45-OK-2.

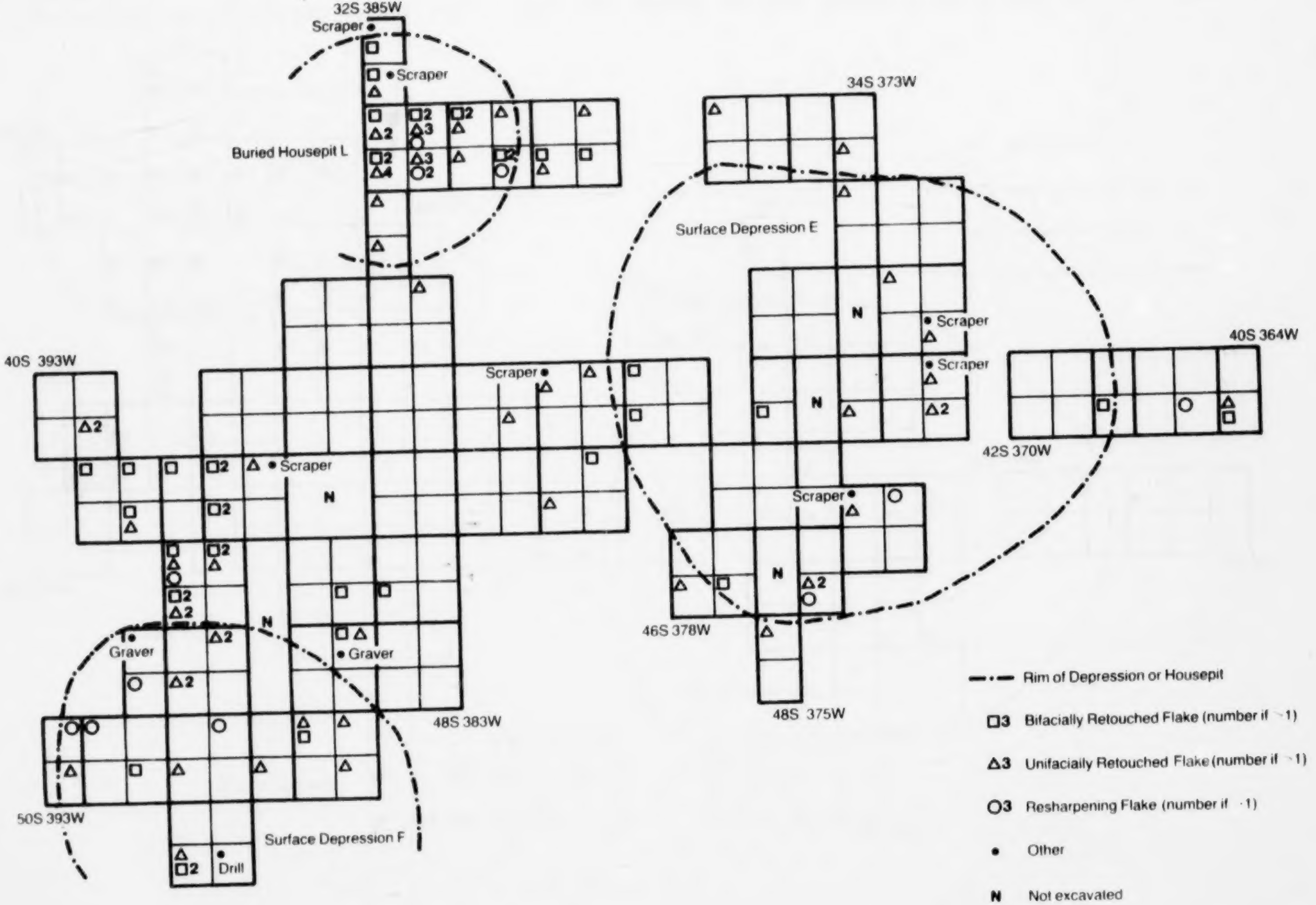

32S 385W
Scraper
Scraper
Buried Housepit L
34S 373W
Surface Depression E
40S 393W
Scraper
Scraper
N
Scraper
Scraper
N
40S 364W
42S 370W
Scraper
N
N
46S 378W
Graver
Graver
48S 383W
48S 375W
50S 393W
Surface Depression F
Drill
Rim of Depression or Housepit
□3 Bifacially Retouched Flake (number if >1)
△3 Unifacially Retouched Flake (number if >1)
○3 Resharpening Flake (number if >1)
• Other
N Not excavated

Figure 7-32. Distribution of bifacially and unifacially retouched flakes, scrapers, drills, gravers, and resharpening flakes, Houses E and F and vicinity, Zone 1, 45-OK-2.

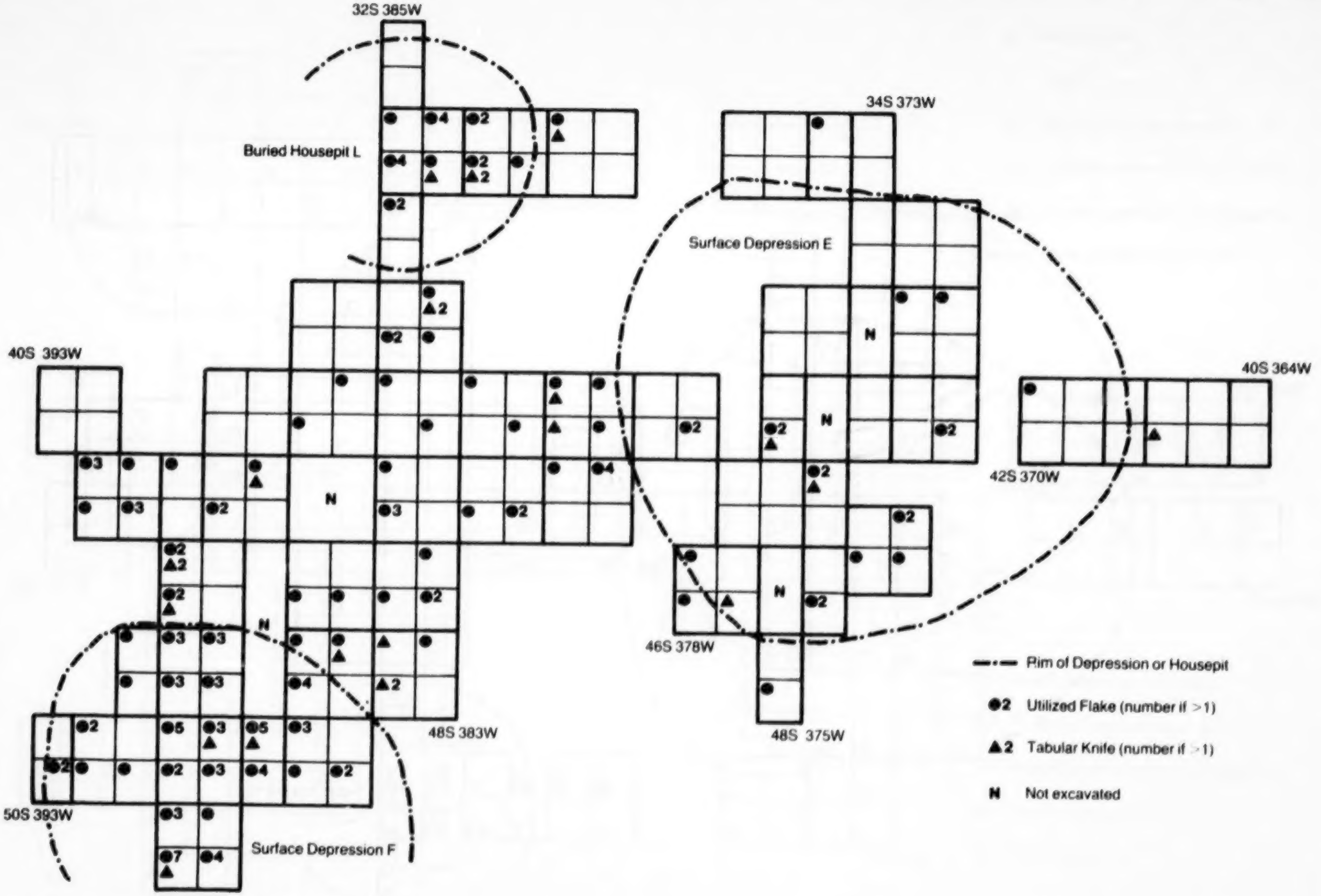

32S 385W
Buried Housepit L
34S 373W
Surface Depression E
40S 393W
40S 364W
42S 370W
N
46S 378W
48S 383W
48S 375W
50S 393W
Surface Depression F
Rim of Depression or Housepit
●2 Utilized Flake (number if >1)
▲2 Tabular Knife (number if >1)
N Not excavated

Figure 7-33. Distribution of utilized flakes and tabular knives, Houses E and F and vicinity, Zone 1, 45-OK-2.

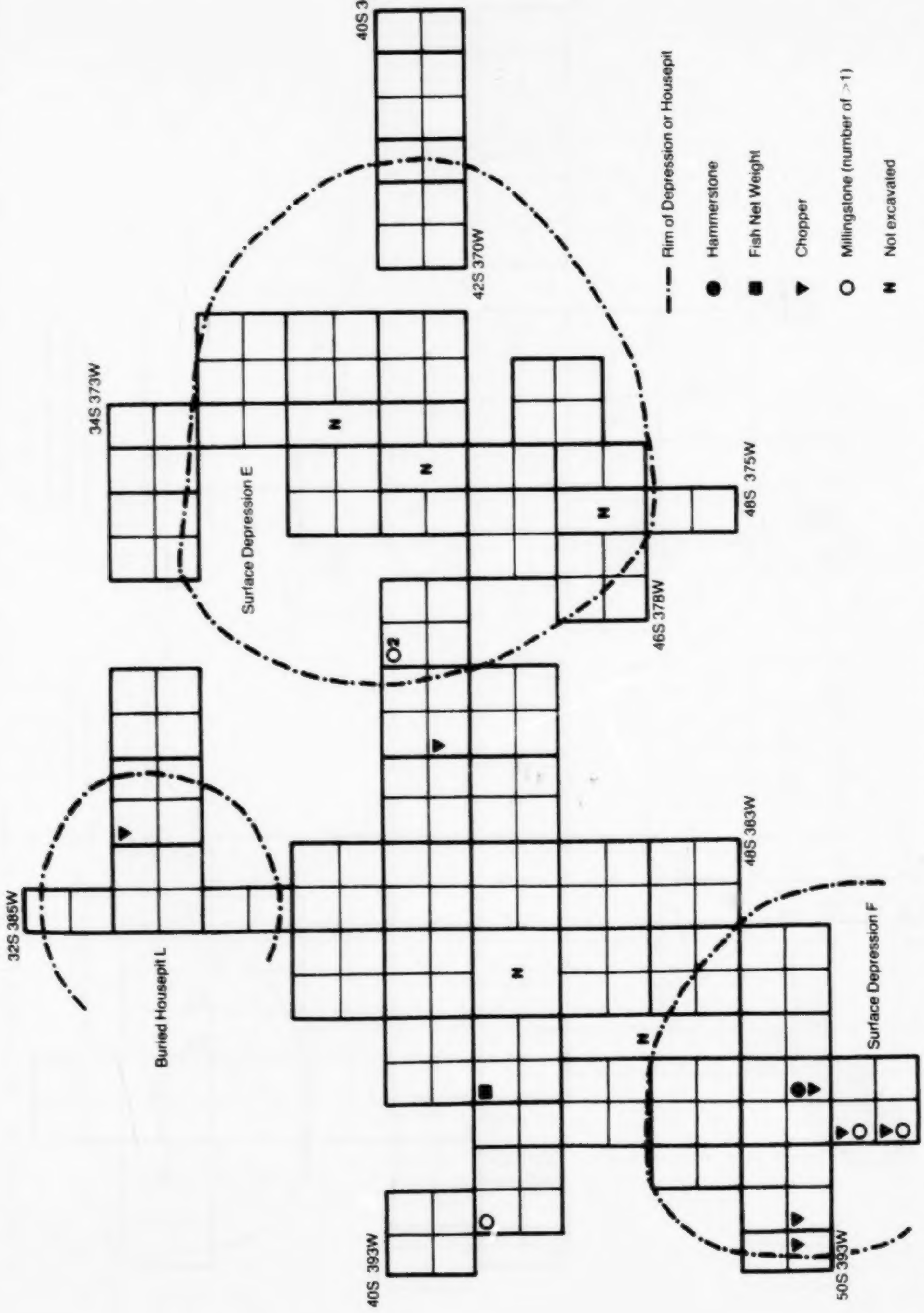

32S 385W
34S 373W
40S 364W
42S 370W
48S 375W
46S 378W
48S 383W
40S 393W
50S 393W
Buried Housepit L
Surface Depression E
Surface Depression F
N
2
Rim of Depression or Housepit
● Hammerstone
■ Fish Net Weight
▼ Chopper
○ Millingstone (number of >1)
N Not excavated

Figure 7-34. Distribution of cobble tools, Houses E and F and vicinity, Zone 1, 45-OK-2.

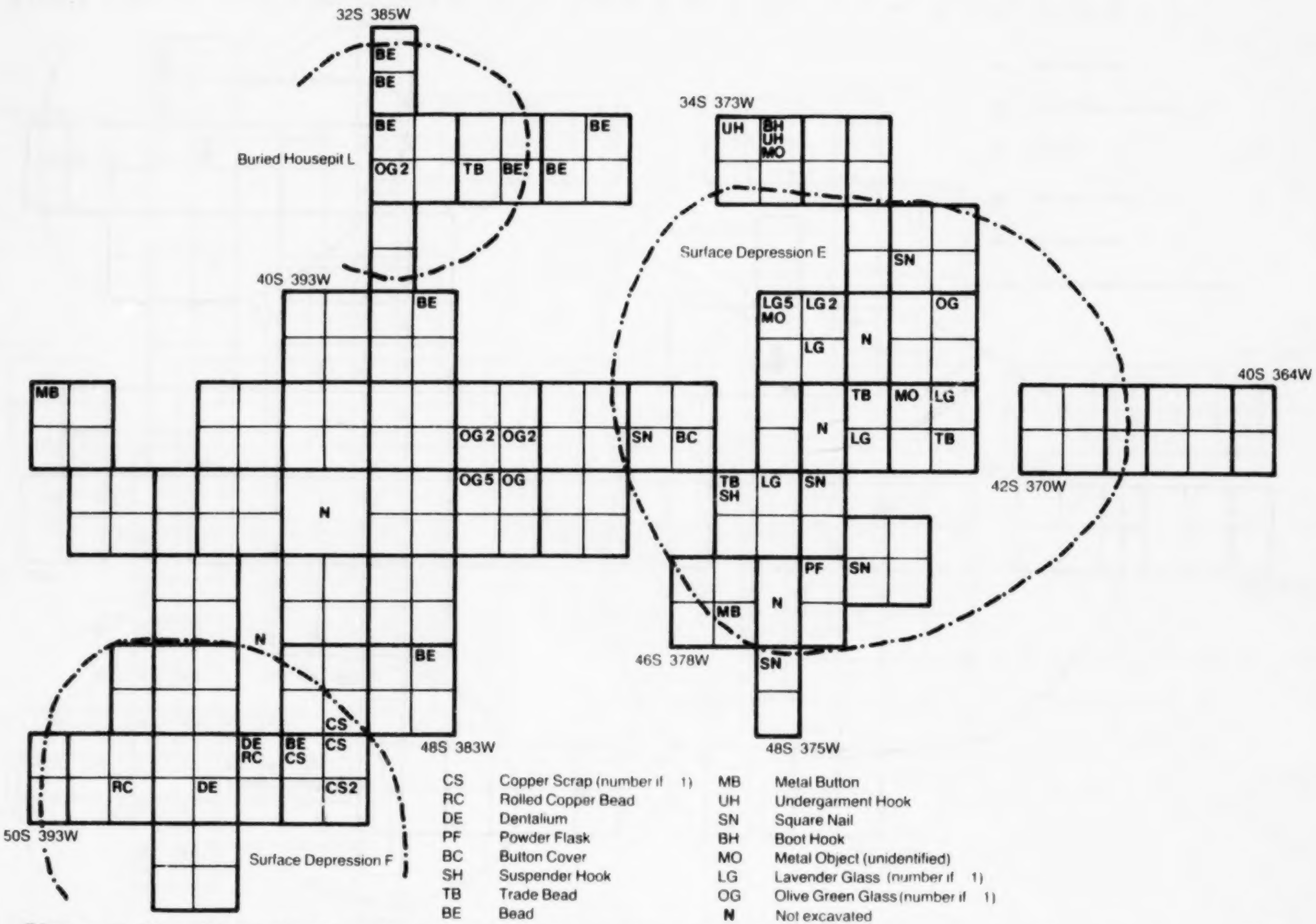

32S 385W
34S 373W
40S 393W
40S 364W
42S 370W
46S 378W
48S 383W
48S 375W
50S 393W
Buried Housepit L
Surface Depression E
Surface Depression F
BE
TB
OG 2
UH
BH UH MO
SN
LG5 MO
LG 2
LG
OG
N
TB
MO
MB
OG 2
OG2
OG5
BC
SH
PF
DE
RC
CS
CS2
CS Copper Scrap (number if 1)
RC Rolled Copper Bead
DE Dentalium
PF Powder Flask
BC Button Cover
SH Suspender Hook
TB Trade Bead
BE Bead
MB Metal Button
UH Undergarment Hook
SN Square Nail
BH Boot Hook
MO Metal Object (unidentified)
LG Lavender Glass (number if 1)
OG Olive Green Glass (number if 1)
N Not excavated

Figure 7-35. Distribution of ornaments and selected historic materials, Houses E and F and vicinity, 45-OK-2.

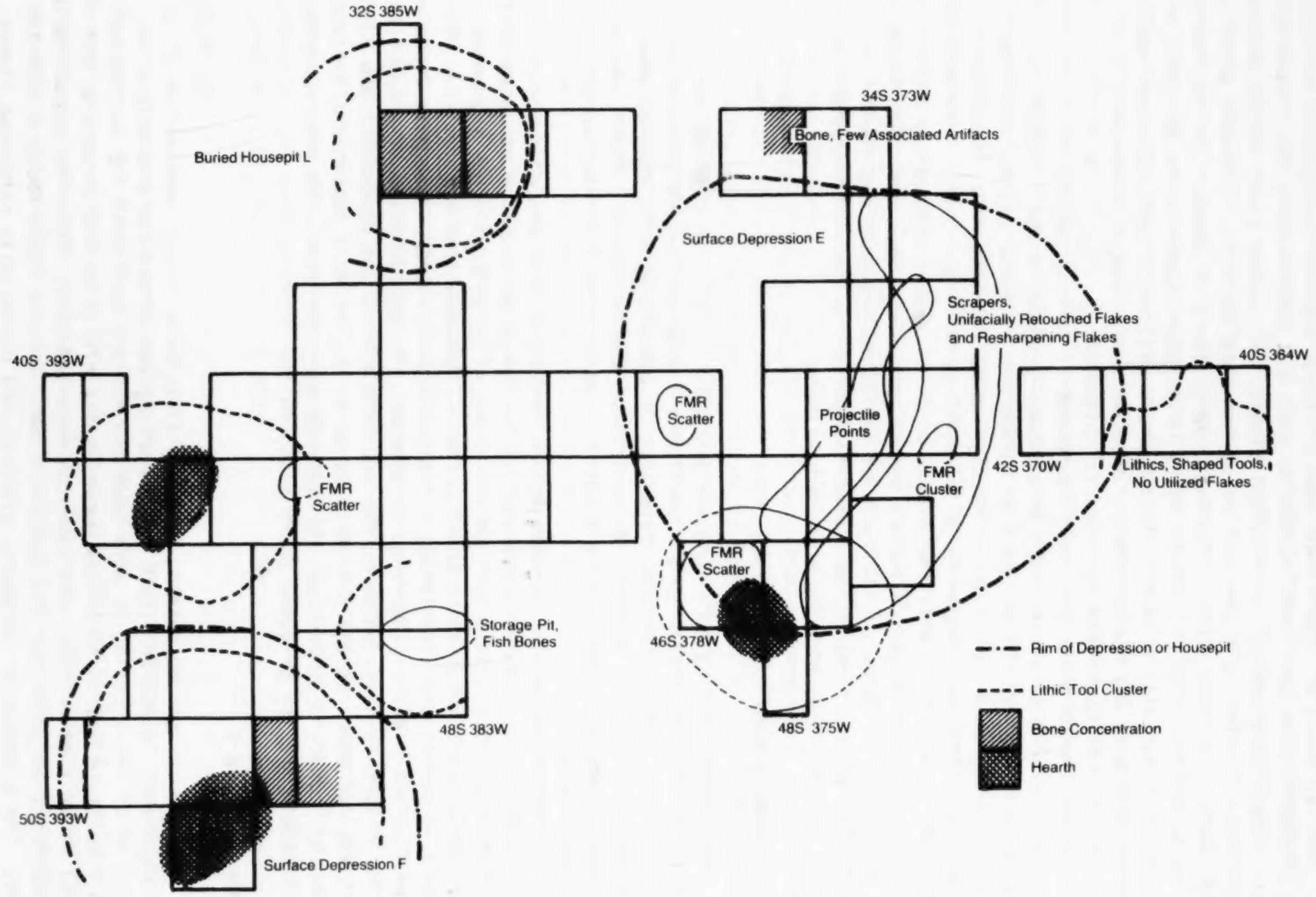

32S 385W
Buried Housepit L
34S 373W
Bone, Few Associated Artifacts
Surface Depression E
Scrapers, Unifacially Retouched Flakes and Resharpening Flakes
40S 393W
40S 364W
FMR Scatter
Projectile Points
FMR Cluster
42S 370W
Lithics, Shaped Tools, No Utilized Flakes
FMR Scatter
FMR Scatter
Storage Pit, Fish Bones
46S 378W
48S 383W
48S 375W
50S 393W
Surface Depression F
Rim of Depression or Housepit
Lithic Tool Cluster
Bone Concentration
Hearth

Figure 7-36. Schematic of activity areas and structure organization, Houses E and F and vicinity, Zone 1, 45-OK-2.

The two quads of high lithic concentration east of Surface Depression E are distinctive in both their number of worn and manufactured tool types and their conspicuous absence of utilized flakes. It is not clear if the adjacent shell concentration is a consequence of the same activity. The quad with large amounts of bone north of Surface Depression E is unusual in its lack of artifacts and the scarcity of artifacts in adjacent quads--a few projectile points, a unifacially retouched flake, and a utilized flake. The contrast between this area and the butchering area east of Housepit 6 may be due in part to the limited sample obtained in this area.

The cluster of bone and shell northeast of Surface Depression F is associated with moderate numbers of bifaces, projectile point fragments, bifacially retouched flakes, tabular knives and utilized flakes. North of Surface Depression F is a cluster of lithic debitage and FMR. Numerous projectile points and fragments, bifaces, bifacially and unifacially retouched flakes are associated. Utilized flakes occur in moderate amounts, and a milling stone, net weight, scraper, and resharpening flake were also found in the vicinity. In terms of the types of artifacts present, and their association with a firepit, this area resembles the inside of Housepit 6. Perhaps an undefined structure is located here.

Other Possible Zone 1 Structures

The gently sloping stratigraphic boundary in DU 31 in 29S360W may indicate a structure built in the partially filled depression above Housepit 2. A distinct peak of cultural materials is associated with this stratum, but no staining or unusual artifact concentration indicative of a floor was noted. A single Columbia Corner-notched B point is associated with this upper cultural occupation.

A circular occupation surface approximately 10 m in diameter occurs in Zone 1 within the Housepit 3 depression. Although no evidence of construction was recovered, it may be a surface structure. Two sets of horse leg bones were found, and a metal and a shell button of Euroamerican manufacture. Three projectile points are associated, a Plateau Side-notched, a Columbia Corner-notched B, and a Wallula Rectangular-stemmed. A concentration of projectile points in Zone 1 in the units on the southern rim of the depression and to the south may represent an activity area associated with this possible structure, or another possible structure. No features were designated in this area, but two probable hearths or ovens are visible in the profiles.

Summary of Zone 1

We have recognized several types of structures in our examination of Zone 1 block areas. Housepit 6 is a long, rectangular structure, probably a mat lodge, which was occupied by more than one family, each with its own activity area. Multiple hearth locations occur in the middle of the structure, but it is not known whether they were used contemporaneously. From the concentration of debitage, we judge that the occupants manufactured stone tools within the house. The presence of scrapers, gravers, and unifacially retouched flakes indicate they also worked softer materials such as bone and hide there. Unifacially retouched flakes are more abundant than bifacially retouched flakes; these were probably used in the same tasks as the scrapers and gravers, which are also unifacial tools. Here, we may infer, the occupants also maintained their tools, and perhaps stored their ornaments. Beads and the like may have been manufactured in the houses. Directly outside, the occupants butchered their kills and processed the plants they had gathered.

In the other area of the site examined, we have found evidence of a rather different type of dwelling. Both Surface Depression F and the Housepit L structure are small--approximately 6 m across--and circular. While Surface Depression F seems to have been deliberately constructed, the occupation in Housepit L took advantage of a depression resulting from the underlying pit house. In Surface Depression F, a wide variety of artifact types are distributed relatively randomly around a central hearth area. The smaller size and the lack of internal segregation suggests that these are single family dwellings. Though no central hearth was recorded for Housepit L, the artifact distributions are otherwise similar. Large quantities of bones were found in both structures, suggesting that bones were processed inside the structure or dumped there after cooking.

Because no postmolds or superstructure remains were found in association with these structures, we assume they were impermanent, seasonal structures--the circular, summer mat lodge described by Ray (1932) is the analogue that best fits the data. Another of these structures might have been located north of Surface Depression F; there, a variety of stone tools were scattered about an oven (Feature 58) and an FMR concentration (Feature 53).

The nature of Surface Depression E is not clear. While the existing boundaries do conform to certain artifact distributions, such as ornaments, they conflict with the evidence of the features. Feature 4 (an occupation surface) and its associated central hearth area straddle the boundary: the complex appears to be a distinct structure. The remainder of Surface Depression E is characterized by low numbers of artifacts, but a certain degree of segregation--unifacially retouched flakes and scrapers occur in the eastern half, bifacially retouched flakes in the western.

The activity areas outside the structures here do not resemble those outside of Housepit 6. As we noted, the one isolated cluster of bone north of Surface Depression E has almost no associated artifacts. Likewise, the one other concentration of bone, the storage pit, is associated with an unspecialized assemblage of artifacts. East of Surface Depression E occurs a possible lithic manufacturing area.

45-OK-2A

Excavation units were placed in four surface depressions at 45-OK-2A--Housepits 8 and 9 and Surface Depressions Y and Z. Housepit 7 was not investigated. The structures found underlying Housepits 8 and 9 and Surface Depression Z are described below. A 1 x 2-m unit (48N15E) on the southern rim of Surface Depression Y, a circular depression 4 m in diameter, revealed no underlying structure. A possible rim occurs on the south wall, but it slopes to the east, rather than towards the center of Surface Depression Y.

ZONE 2

House 8

Osborne gave the designation Housepit 8 to a surface depression measuring 16.4 m north-south and 15.2 m east-west, varying in depth from 1.0 to 1.5 m. Excavation by Osborne and CJDCRP indicate that the depression is underlain by a circular semisubterranean pithouse.

We excavated three 1 x 2 m units in the depression, 48N28E near the northern rim, and 36N29E and 36N30E on the southern rim. No indication of a subsurface structure was found in the southern units, but a rim and floor were encountered in 48N28E (Figure 7-37). The wall is 50-60 cm high and steeply sloping. The dark silty matrix of the floor (Feature 10) contained numerous mammal bones. A pit (Feature 20) measuring over 1.2 m wide and 40 cm deep, extended down from the floor. A 10 cm thick layer of orange and dark staining at the base of the pit was covered by sterile, unstained soil.

Osborne's excavations, more extensive than ours, add information about features on the floor. Two trenches were excavated at right angles, meeting in the center. The north-south trench was 9.8 x 1.0 m and the east-west trench was 2 x 1.0 m; maximum depth was approximately 1.3 m. Three features were recorded on the floor--an area of charred wood and charcoal, and two concentrations of large mammal bones. Lithic artifacts found in the depression included quartzite knives, scrapers, and a drill. Several stemless points and fragments of large blades of chalcedony and basalt were recovered, which Osborne judged were not in the local style.

House 9

Osborne designated a 0.3 m depression measuring 3.9 m north-south and 4.6 m east-west as Housepit 9, but he did not test it. We excavated two 1 x 2-m units, 40N94E and 46N92E, inside the surface depression, revealing a circular semi-subterranean pit house (Figure 7-38). The floor is sloping, rather than flat, and the wall abruptly rises 30 cm on the west side, and gradually 50 cm to the north. Several large pieces of burned wood are scattered along the base of the structure. A large piece of burned wood found at the very base of Feature 11 appeared to be a post lying on its side. It was surrounded by burnt matrix and underlain by a white matrix, probably ash. The stratified fill of the depression indicates reuse, although the upper pits are smaller. A rim and floor were also found in 40N94E (not illustrated); these probably are the same floor. They occur in the same stratigraphic position, except that the sterile layer that occurs in the northern unit between the housepit rim and upper stained layer is lacking in the southern. The floor in the northern portion of 40N94E does slope to the north, however, and is probably a continuation of the floor described above.

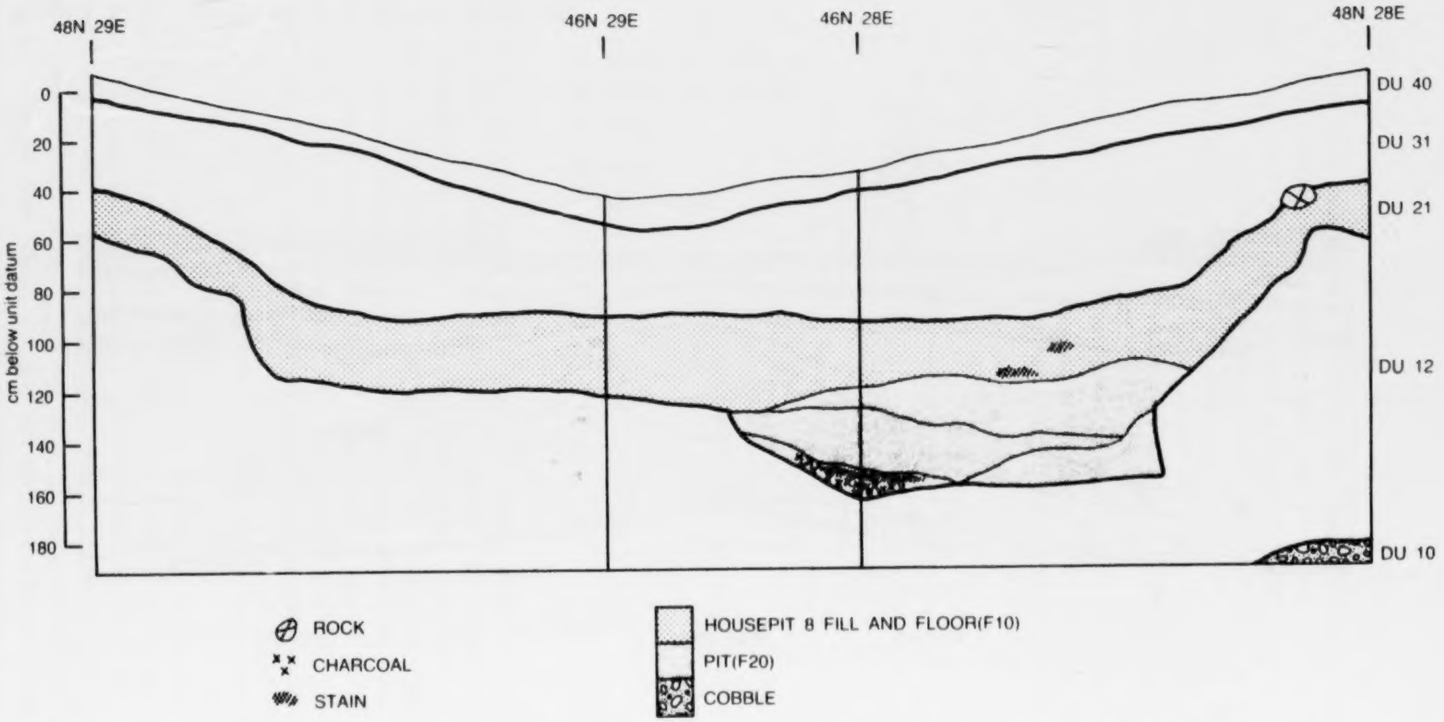

48N 29E
46N 29E
46N 28E
48N 28E
cm below unit datum
0
20
40
60
80
100
120
140
160
180
DU 40
DU 31
DU 21
DU 12
DU 10
ROCK
CHARCOAL
STAIN
HOUSEPIT 8 FILL AND FLOOR(F10)
PIT(F20)
COBBLE

Figure 7-37. Profile of House 8, 45-OK-2A. Note that this is a profile of a single 1 x 2-m unit. Both east and west walls are shown to illustrate pit in floor and variation in wall construction.

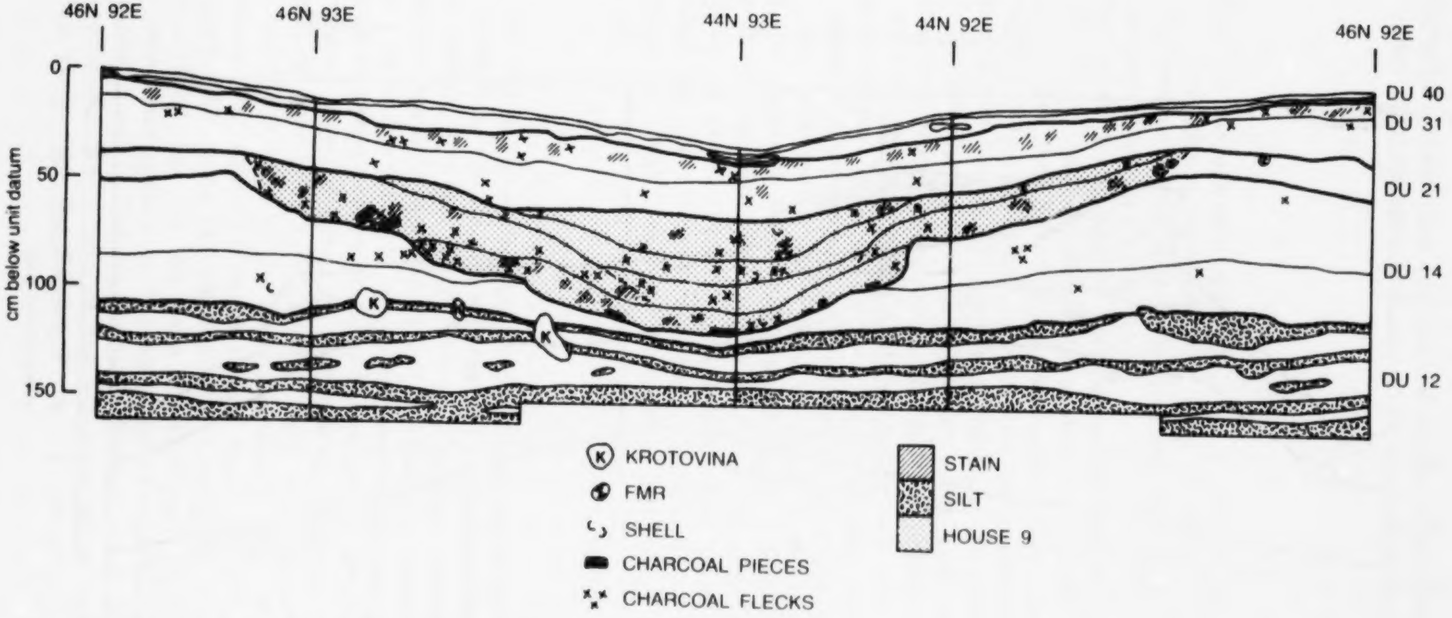

46N 92E
46N 93E
44N 93E
44N 92E
46N 92E
0
50
100
150
cm below unit datum
DU 40
DU 31
DU 21
DU 14
DU 12
K
K
KROTOVINA
FMR
SHELL
CHARCOAL PIECES
CHARCOAL FLECKS
STAIN
SILT
HOUSE 9

Figure 7-38. Profile of House 9, 45-OK-2A.

House Z

Adjacent to Surface Depression Y and to the south is a circular depression 6 m in diameter, labelled Surface Depression Z by the CJDCRP. A 1 x 2-m unit, 46N14E, placed on the northern rim of the depression intersected the wall and floor of an underlying semi-subterranean pit-house (Figure 7-39). The walls are approximately 30 cm high and slope abruptly. The wall on the east side apparently slumped before much floor debris accumulated, and was re-excavated further in. The floor (Feature 19), which extended only a small distance into this unit, was a darker matrix with many crushed bones, some of which were burnt. An area of lighter soil indicate a pit originating on the floor. Although it was not excavated as a feature, field notes indicate that it was at least 12 cm deep and contained many fish bones.

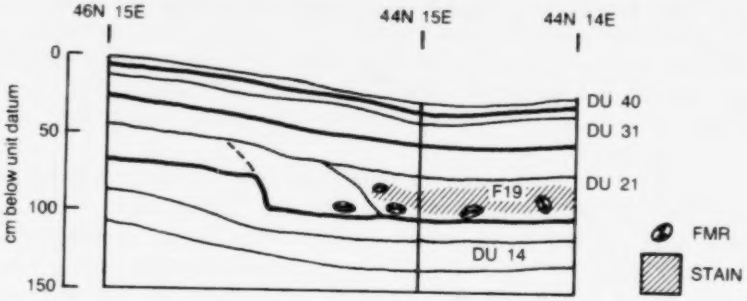


Figure 7-39. Profile of House Z, 45-OK-2A.

SUMMARY

The structures excavated at 45-OK-2 and 45-OK-2A vary in size, shape, and type of construction. In Zone 4 at 45-OK-2A there is only one possible structure. If indeed a structure, it is different in construction from later structures, being a steep but low-walled excavation into the cobbles; its size and shape are unknown. There are two possible structures in Zone 3, both at 45-OK-2. One is a large circular area with shallow, sloping walls and a floor densely packed with debris. The walls of the other feature are not well defined but seem to be low and gently sloping. Two postmolds occur on the floor which is well defined by dense concentrations of cultural debris. The structure is circular and approximately 6 m in diameter. Structures were found at both sites in Zone 2. The majority are circular to oval excavations with abrupt, steeply sloping side walls 0.5-1.0 m high. Diameters range from 10.0 to 14.0 meters, except for Feature 49, which has a diameter of 3.0 m. Most have a well defined floor, and show no evidence of recurring episodes of excavation and occupation. Size difference among constructions of this type may indicate different functions. Two shallow surface structures were also found in Zone 2. One is the lower occupation of Housepit 6, a rectangular surface structure 10.0 x 5.0 m and 20-30 cm deep. The other is a circular depression of 6.0 m in diameter and 10-20 cm deep. At 45-OK-2, Zone 1 contains two types of structures at 45-OK-2--shallow circular depressions and shallow rectangular depressions. The rectangular structures are up to 10 m in length and the circular depressions range between 4.0 and 8.0 m in diameter. In both types, the side walls are generally 20 cm high, and may be abrupt or sloping. In several cases, the small circular depressions occur within the confines of a surface depression created by an underlying housepit.

The variation in structures between the zones indicates changes through time in cultural practices of shelter construction, as well as in both the season and nature of the occupations. We have only uncertain evidence of a structure in Zone 4. Zone 3 has two possible structures, both of which are large and shallow. Zone 2 is distinctive in the ample testimony it bears of large, semi-subterranean pit houses. Zone 1 is equally distinctive as a consequence of the remains of mat lodges that occur there.

8. SYNTHESIS AND CONCLUSIONS

Extensive excavations at 45-OK-2 recovered numerous remains from historic and prehistoric cultural activities in a long narrow strip along the present river shore. Radiocarbon dates associated with the deposits range from 3900 B.P. to modern, indicating a 4000 year period of use. On the basis of the association of cultural materials with the natural stratigraphy, this long span was divided into four periods, or zones, all of which contain evidence of an **in situ** cultural occupation. A similar sedimentary sequence, with the addition of one older deposit, was found at site 45-OK-2A, located at the eastern end of the same river bar. Cultural materials at this site have been divided into five zones, only the latest two of which have evidence of intense use.

The large and diverse artifact assemblages have been subjected to several types of analyses, separately reported in previous chapters of this report. All of these types of artifacts, stone tools, bone tools, food wastes, features, and plant remains were part of a functioning system of survival. Stone projectile points were used to kill the elk whose bones are represented in the deposits. Antler tine flakers were used in manufacturing stone tools, and stone gravers were used in incising deer and elk metapodials so that they could be split and used as awls. In the first section of this chapter we attempt to integrate the results of the separate analyses and provide a brief descriptive picture of material culture applicable to the site in general. Although frequency varies, the zones differ little in the nature of the artifact types and features which indicate technological practices and subsistence activities. Following this section, the zones are summarized individually, with an emphasis on depositional environment, chronology, and the site function and season of use.

FUNCTIONAL INTERPRETATION OF ASSEMBLAGE

The artifacts, features, and faunal and floral remains recovered from 45-OK-2 and 45-OK-2A provide us with a rich picture of the human activities at the site: there, animals were butchered and plants processed, meals were cooked around stone hearths, and foods stored for future use. We have abundant evidence of homo faber--man the artificer--as well: the occupants manufactured a tremendous range of tools from bone and stone; and shaped wood and worked hides as well. They even left behind a few things less utile than beautiful, such as the mouthpiece of a flute carved in the likeness of some stubby-eared, open-mouthed bear-like creature.

Many of the remains were the consequence of hunting and fishing, activities central to the occupants' existence throughout all zones. Large assemblages of bones of fish and mammals were recovered from 45-OK-2. Significantly, these bone assemblages vary little in composition from zone to zone; the much smaller 45-OK-2A assemblage resembles that of 45-OK-2. The bones of four artiodactyls (deer, elk, mountain sheep, and antelope)--economically valuable for their meat, hides, and bone and antler for tool production--occur in abundance. The bones of mountain sheep are absent from Zone 3 at 45-OK-2, otherwise each occurs in all the zones. While many artiodactyl bones lack sufficient diagnostic criteria to be identified to species, the number of bones in the deer sized, elk sized, and sheep/antelope categories indicate the greater incidence of these species. Although nearly the entire skeleton is represented in the identified deer bone elements, limb bones occur in higher proportions than they ought to if carcasses were carried whole to the site. Evidently the carcasses were partially butchered at the kill site before being brought back to the site. Here, the portions were further butchered and the bones smashed to extract marrow.

Marmot bones, recovered in all zones except Zone 3, and rabbit bones, recovered only in Zones 3 and 4 at 45-OK-2, may have been economic species. Other mammal species are represented at 45-OK-2, but only in low numbers. river otter, beaver, and muskrat were probably used for pelts as well as meat. Both the pelts and the meat would have been best in the winter and the animals would also be less active and easier to procure at this time. Bear, lynx, and canid elements occur; these animals may have been used for purposes other than food. Lynx and grizzly bears remain at higher elevations throughout the year and could not have been obtained near the site, while black bears may have come down to the lower terraces when the berries were ripe. We do not know if the canid bones are dog, wolf, or coyote, each of which would have a rather different significance. Turtle bones and carapace fragments were found in every zone, and clearly were used for food. The snake and toad bones, also ubiquitous among the zones, may indicate economic exploitation of these species. Neither we, nor other researchers, have determined if these animals were exploited in this area.

Salmon bones dominate the fish bone assemblages. Small numbers of bones of the minnow family occur as well; the bones of sucker fish are confined to Zone 4. We do not have a generous selection of tools used in fishing--two net weights, three fragments of harpoon valves, and a composite harpoon point occur in Zone 1 at 45-OK-2. The occupants stored fish in large pits, frequently excavated in a house floor. From the fragmented nature of the salmon vertebrae in the pits, we infer that the fish were pounded, probably after drying.

Our information on plant foods is less extensive than for animal foods. Only a small volume of site sediments could be analyzed for plant remains, and most botanical remains were non-edible materials. Zone 3 yielded a single chokecherry pit from exterior occupation debris. All other edible plant remains were from Zone 2, both inside and outside houses. An assemblage including a sunflower seed, a bitterbrush seed and a fragment of root tissue, possibly lomatium, was found in occupation debris in Housepit 3, and chokecherry pits and an unidentified seed were recovered from the floor of Structure N. A single serviceberry seed was found in exterior occupation debris in Zone 2.

All of the zones at 45-OK-2 contain diverse tool assemblages. The recovered by-products of stone tool manufacture--flakes, cores, chunks, partially worked bifaces, and resharpening flakes--represent four different lithic manufacturing sequences. Conchoidally flaking materials were reduced to obtain small thin flakes for the manufacture of shaped tools. Locally available materials were the primary raw material used, but imported materials such as obsidian, argillite, and petrified wood were used efficiently when available. Locally available cobbles of dense materials such as basalt and quartzite were fractured to produce large heavy flakes. Cobbles of specific shapes and material types were selected from the diversity available in the river gravels for use as cobble tools. The fourth sequence was the reduction and shaping by abrasion of soft fibrous and platy materials. At 45-OK-2, the only items made this way were items of personal adornment. Except for this latter sequence, the lithic manufacturing sequences are represented in their entirety, from initial reduction to finishing, and the associated tools--hammerstones, anvils, and antler tine flakers--were also found. One feature specifically identified as a stone tool manufacturing area--a concentration of tiny flakes deriving from the final stages of tool finishing--was found on a house floor. Associations of lithic debitage with manufacturing by-products such as projectile point fragments and bifaces found in Zone 1 houses are interpreted as lithic manufacturing areas.

A complete bone tool manufacturing sequence is also present. Bones were fractured with a blow from a hammerstone, or grooved and split to produce long regular fragments. Some fragments with points or sharp edges were used in that form. Others were shaped and ground to form special tools. Such stone tools as scrapers, gravers, and drills, which were recovered throughout the site, were manufactured in order to work softer materials such as wood, bone, leather and textiles. An eyed bone needle and several polished bone awls also attest to the working of soft, flexible materials to make clothing and other items.

The occupants collected driftwood, including exotic woods such as red cedar and yellow cedar, from the beach and shaped it into beams and planks such as those found in Structure N. Even fir, spruce, juniper, hemlock and pine, available within a 10 mile radius may have been picked up in the form of large logs on the beach for use in house structures. Wood was shaped with antler wedges, large hammerstones, and what may be flaked stone wedges. They also did finer woodwork. The small fraction of charcoal from the site which could be examined by the botanist yielded two wood tools: a point made of larch, and a small fragment of conifer wood coated in pitch. Several local woods--hackberry, mock orange, aspen, hawthorn, and serviceberry--were found in small quantities and only a few samples; these may have been used to manufacture artifacts, rather than for fuel. The same is true of yew, an exotic wood. Fragments of clematis stem, cedar bark and cordage of unknown material are evidence of the textile arts. The material which makes up the carbonized matting noted in some houses has not been identified.

The widespread distribution of rocks cracked and discolored by fire indicate that both cooking and heating were important activities at the site. We have evidence that fire-making was a well developed technology among the occupants. Building, using, and dismantling fires, they left behind excavated ovens, surface hearths, scatters of FMR, orange fire-stains, and what may be stores of FMR. The striking similarities from zone to zone among excavated ovens, hearths, and other features reveal that these structures were built according to tradition for specific purposes. Local woods were used as fuel in specific combinations --such as pine and bitterbrush--which are found at several sites in the project area.

SYNTHESIS BY ZONE

Each zone at the two sites presents different problems for interpretation. They differ in the length of time which they represent, the distinctness of the stratigraphic boundary by which they are recognized, which spatial areas of an occupation were sampled, and the preservational environments which prevailed. All of these factors are potential biases that may affect our interpretation of what prehistoric people did at a particular time, and cause comparisons of zones to be fraught with potential problems. In the following section, in which each zone is described individually, we mention such analytic considerations where pertinent.

ZONE 5, 45-OK-2A

The oldest deposit containing cultural materials at the two sites is the alluvial fan at the eastern end of 45-OK-2A. The interbedding of angular fan materials with coarse, rounded river deposits suggests that alluvial fan accretion was intermittent with deposition of the gravel bar. Cultural deposits incorporated in the fan may be secondary. The 26 objects collected from the stratified layers of angular and rounded cobbles include bone, shell, and eight modified artifacts. They provide no evidence of an *in situ* occupation, nor are there any indications of their origin or age.

ZONES 3 AND 4, 45-OK-2A

Zones 3 and 4 at 45-OK-2A comprise cultural materials from the lower bar deposits accumulated on the cobble bar surface. It is likely that these deposits are somewhat older than the similar deposits at 45-OK-2 as the bar probably accreted in a downriver direction. We lack radiocarbon dates to evaluate independently the chronological relationship. The single diagnostic item recovered from Zone 3--a Windust B projectile point--is older than the point styles represented in Zones 3 and 4 at 45-OK-2, and thus supports this contention. This scant evidence indicates that these zones are Kartar phase components.

Cultural materials in Zone 4 are scarce: the 347 items collected include only two FMR and 59 modified artifacts; the remainder are bone and shell which could possibly be natural. No features were recovered. The assemblage from

Zone 3 also lacks features but includes a larger number and wider variety of artifacts indicating an increase in the intensity of use.

ZONE 4, 45-OK-2

Use of the 45-OK-2 area began when the cobble surface was still exposed, as indicated by cultural materials found directly on that surface. These cultural materials and those in the lower bar sediments--well stratified sands, loamy sands, and silts--which overlie them have been designated as Zone 4. We found no evidence of a substantial time lag between first occupation of the cobble bar and accumulation of the lower bar sediments. In fact, correlation of the lower bar sediments across the site may be difficult. Deposition was greatly influenced by the topography of the cobble surface. In higher areas, the cobble field was exposed for some time, but in the lower areas of the site, accretion began immediately. Our oldest radiocarbon date from this zone, is from Feature 32, an extensive occupation surface which overlies 10-20 cm of sand and loamy sand which in turn overlies the cobbles, while younger radiocarbon dates were obtained from directly on the cobble surface.

The four radiocarbon dates from this zone--ranging from 2900 B.P. to 4100 B.P. with one standard deviation--place it in the Hudnut phase defined for this reservoir (Figure 7-1). In the Mid-Columbia sequence, recently revised by Galm et al. (1980), Zone 4 is equivalent to a Frenchman Springs component (Figure 7-2). In the chronologies developed for the Wells Reservoir and Kettle Falls, Zone 4 equates with the Chiliwist and Ksunku phases respectively, although if Zone 4 is considered to be a single component, the radiocarbon dates conflict slightly with the boundaries used in these schemes. The Zone 4 projectile points, which include Rabbit Island, Cascade, and single examples of lanceolate and corner-notched forms are consistent with these phase assignments.

The most common cultural deposits are large sheet middens comprised chiefly of freshwater mussel shells, but also including bone, FMR, and bone and lithic artifacts. Many of these are sloping, and it is possible that some were reworked on the beach front. However, _in situ_ cultural materials, such as pits and hearths, also occur in this zone. Evidence of structures is limited to a single, inconclusive case--a possible shallow wall excavated into the cobble surface and associated with an increase in artifact density. The single plane of exposure does not allow definitive interpretation, but there are similarities to Housepit 1 at 45-OK-208, an extensively excavated shallow house in the cobble stratum, dated to around 4600 B.P. (Chatters 1984). The widespread distribution of Zone 4 materials across the site suggests, at the very least, long-term intermittent use of the area during this time period. Some aspects of the site assemblage--the dominance of shellfish remains and the paucity of structures, for example--suggest that the site was used intermittently as a seasonal camp. However, the distribution of deer mandible ages indicates that the site was used year-round. It is significant perhaps that the possible house is located relatively far from the river and at a relatively high elevation. Seasonal high river levels may have been higher between 4000 and 3000 B.P., and the dwelling areas located on higher ground than in later occupations. In that case, the bulk of the materials excavated in this zone may have been midden dumped out in front of houses. Whether the site was used only for limited activities or whether it was a more permanent habitation site is still in question.

ZONE 3, 45-OK-2

Zone 3 comprises cultural materials found in more massively bedded sediments overlying the lower bar sequence. These accumulated between 3000 and 1500 B.P. as indicated by the dates of cultural materials in the underlying and overlying sediments. With but a single radiocarbon date from Zone 3, we cannot be too certain of the range of occupation. Certainly it is bracketed between the Zones 2 and 4 occupations, but whether occupation was continuous throughout this period, or whether there is a hiatus between Zones 3 and 2 is unclear. Cultural materials are found in this zone throughout the length of 45-OK-2; the deposits include large, sloping, shell-laden strata like those in Zone 4, and two houses. Seasonal indicators do not point to any marked seasonality of use.

The contents of Zone 3 are very similar to those of Zone 4. The most significant difference is that two structures were found in Zone 3. Although the frequencies of some artifact types in Zone 3 are intermediate between those of Zones 4 and 2, generally Zone 3 is more similar to Zone 4. The projectile points assemblage of Zone 3 is dominated by Rabbit Island points, as is that of Zone 4; however, the relative frequency of Rabbit Island A and B are reversed. Also, there are more basal and corner-notched forms in Zone 3, consistent with its younger age.

The overlap of radiocarbon dates between Zones 4 and 3 suggests that there is an imperfect temporal separation. This may be attributable to the nature of the stratigraphic boundary selected for the zone boundary. Zone 4 corresponds to the lowest sediments, texturally diverse and well stratified, while Zone 3 corresponds to higher sediments, more massively bedded (the beginning of the upper bar sequence). In any given location, this is a reasonable and useful chronological distinction. However, using this boundary for site-wide correlations relies on the assumption that the upper boundary is isochronic throughout the site, an assumption which our examination of the cultural materials suggests is false. Indeed, if we reconsider the bar formation process we will see why. If the silt bands are deposited at a certain location relative to the bar front, and the bar accretes rapidly downriver, considerable lateral variation in the age of the silt bands would result. Cultural materials above the silt bands at the upriver end of the site could be younger than cultural materials below the silt bands further downriver. The distinction between Zones 3 and Zone 4 is valid in any limited area of the site; however, there is probably temporal overalap between the two zones on a site-wide scale.

ZONE 2, 45-OK-2, and Zones 2 and 1, 45-OK-2A

Zone 2 at 45-OK-2 is a Coyote Creek phase component associated with overbank deposits of the Columbia River. Radiocarbon dates range from 500 B.P. to 1300 B.P. This correlates it with the Cayuse phase in the Mid-Columbia sequence, and the Cassimer Bar and Sinaikst phases defined for Wells Reservoir and Kettle Falls respectively. This zone was excavated more extensively than the two older zones, and a very large assemblage was recovered.

Cultural materials in this zone are extensive and dense. The structures found and the seasonal indicators suggest that the site was used as a winter village and also used during the summer. At least eight circular semi-subterranean pit houses were built at the site during this time. The meager stratigraphic evidence of re-excavation and reuse suggests the structures were used for relatively short periods of time. Though we cannot know how many structures were occupied at one time, we suspect more than one was. Such seasonal indicators as we have--marmot and turtle bones, traces of service berries--do not precisely fix the season of occupation but indicate a range between March and October. However, the presence of semi-subterranean dwellings, laborsome to construct but well-insulated, indicates winter occupation. The overbank deposits seem to have accumulated steadily during this period, burying housepit depressions and occupation surfaces and helping to preserve them.

Zone 2 at 45-OK-2A is associated with similar sediments. Projectile points indicate that the zone falls within the time range of Zone 2 at 45-OK-2. The most intensive occupation at 45-OK-2A, Zone 2 includes several structures. Zone 1 at 45-OK-2A is stratigraphically younger than Zone 2, but diagnostic projectile point styles indicate that it is younger than Zone 1 at 45-OK-2, and falls within the time range of Zone 2 at 45-OK-2.

ZONE 1, 45-OK-2

Zone 1 corresponds to the uppermost overbank deposits, which contain evidence of Native American use of the site between 500 B.P. and 50 B.P. (1450 - 1900 A.D.). The earliest radiocarbon date in the zone is approximately 300 B.P., but the surface of the site had probably stabilized by 500 B.P. Both older and later deposits of this zone--that is, those containing trade goods and those lacking them--are found in the same position relative to the surface. A thick flood deposit and an organic layer commonly overlie the uppermost Native American materials. Although these historic period deposits are included in Zone 1 because they could not easily be separated, there is little problem of contamination. A few historic artifacts, such as bottle caps are clearly very recent; however, these are very scarce and there is no evidence of intensive activities such as homesteading.

This zone is placed in the Coyote Creek phase, although it might possibly be more useful to have a distinct protohistoric/historic phase. During this period, a number of structures were built and occupied at the site. They are so well preserved we could examine activity areas in and around the houses.

The occupants used two types of structures--shallow, rectangular multifamily mat lodges and small, circular, single family mat lodges. Again, our seasonal indicators--marmot and turtle bones--only provide us with a wide range of months (March to October) when the site might have been occupied.

The three large houses excavated in this zone provide a chronological sequence from prior to 1800 until after 1850, thus allowing us to examine possible changes related to contact. House construction, to the extent that we have the data, was similar except for the addition of nails in building the latest house. Internal organization is similar in the two oldest houses, although the earliest is a single family dwelling and the other a multiple family dwelling. In the latest house, the internal organization appears to be quite different, although the significance of this shift can not be interpreted on the basis of this limited study.

The incorporation of trade goods into the material culture follows classic patterns. In the earliest house, dating before direct contact in this area, the only items of Euroamerican origin are copper spacer beads and copper scraps. Copper entered the native trading networks and was widely circulated soon after the first coastal contacts, and predates many other types of trade items. Although the material was foreign, a technology for making ornaments developed rapidly, and it was the raw material, in the form of strips, which was traded rather than finished products. The assemblage of copper scrap found in House F indicates that it was being worked at the site.

The slightly later assemblage from Housepit 6 includes a small number of trade goods, limited to copper and beads which circulated widely prior to 1830. At this time then, the impact of trade goods seems to be limited to circulation of nonfunctional items such as ornaments. The steatite may possibly also be a trade item in the raw form, as steatite was apparently traded from Fort Okanogan. However, it was worked by traditional methods, such as abrasion with horsetails.

The latest historic house, dating after 1850, contains a greater diversity of Euroamerican manufactured goods, and items which are not limited to personal adornment. The clothing fasteners, suspenders and undergarment hooks may be considered either personal ornaments or functional items. The alteration of military button to a tinkler form certainly suggests that not all of these items were used for the original function. There are, however, functional items represented. The powder flask in particular represents an important shift in hunting technology based on adopted items. That this is a change in material culture, and not simply an addition to existing technology, is indicated by the small number of stone projectile points, and the peculiar lack of stylistic similarity in those which occur. Interestingly enough, there are very few glass fragments, and these come from only two different vessels. Evidently the use of glass vessels had not become common.

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APPENDIX A:
RADIOCARBON DATE SAMPLES, 45-OK-2

Table A-1. Radiocarbon date samples 45-OK-2.

Lab Sample #1	Zone	DU	Stratum	Unit	Level	Feature #	Material/gms	Radiocarbon Age (Y.B.P.) T1/2=5568	Dendrocorrected[2] Age (Y.B.P.) T1/2-5730
B-2524	2	21	-	26S368W	30	49	Carcoal/12.8	840±60	839±68
	Sample = Incompletely charred willow (Salix sp.). Wood from Structure N (F49) superstructure.								
B-2525	1	31	-	44S377W	20	4	Carcoal/13.5	190±70	196±70
	Surface Depression E floor.								
B-2526	2	21	-	52S440W	50	-	Charcoal/6.4	530±70	556±80
B-4271	4	12	-	84S551W	150	-	Charcoal/2.8	3130±100	3414±114
	Two samples combined, a regular C-14 sample plus a miscellaneous sample.								
B-4272	3	14	-	32S371W	70	-	Charcoal/3.5	2860±70	3066±76
B-4273	4	12	-	30S369W	160	50	Charcoal/5	3520±90	3926±158
B-4274	4	12	-	40S365W	90	32	Charcoal/7	3560±80	3977±153
B-4275	2	21	-	24S371W	90	97	Charcoal/5	1130±80	1112±92
	Sample = juniper (Juniperus scopularum) and semicarbonized lodgepole pine (Pinus contorta).								
B-4276	1	31	-	48S388W	20	9	Charcoal/5	220±80	227±80
B-4277	2	21	-	34S383W	100	-	Charcoal/5	1290±8	1268±85
B-4278	1	31	-	4S392W	120	-	Charcoal/5	Modern	Modern
	Radiocarbon age <170 B.P., 2 sigma statistics.								
B-4279	2	21	-	42S392W	60	58	Charcoal/10	780±50	783±58
B-4280	2	21	-	29S360W	110	200	Charcoal/5	1150±160	1131±168
B-4281	1	31	-	52S446W	40	-	Charcoal/5	Modern	Modern
	Radiocarbon age <110 B.P., 2 sigma statistics.								
B-4282	4	11	-	38S419W	140	79	Charcoal/5	2810±80	3001±95
B-4283	2	21	-	53S493W	100	68	Charcoal/10	500±80	529±89

[1] B samples were dated by Beta Analytic, Inc.

[2] Dendrocorrected according to Damon et al. (1974).

APPENDIX B:
ARTIFACT ASSEMBLAGE, 45-OK-2 AND 45-OK2A

Table B-1. Technological dimensions.

DIMENSION I: OBJECT TYPE

Conchoidal flake
Chunk
Core
Linear flake
Unmodified
Tabular flake
Formed object
Weathered
Indeterminate

DIMENSION II: RAW MATERIAL*
Shale
Jasper
Chalcedony
Petrified Wood
Obsidian
Opal
Quartzite
Fine-grained quartzite
Basalt
Fine-grained basalt
Silicized mudstone
Argillite
Granite
Siltstone/mudstone
Schist
Steatite
Bone/antler
Ochre
Shell
Indeterminate

DIMENSION III: CONDITION

Complete
Proximal fragment
Proximal flake
Less than 1/4 inch
Broken
Indeterminate

DIMENSION IV: DORSAL TOPOGRAPHY

None
Partial cortex
Complete cortex
Indeterminate/not applicable

DIMENSION V: TREATMENT

Definitely burned
Dehydrated [heat treatment]

ATTRIBUTE I: WEIGHT

Recorded weight in grams

ATTRIBUTE II: LENGTH

Flakes: length is measured between the point of impact and the distal end along the bulbar axis

Other: length is taken as the longest dimension

ATTRIBUTE III: WIDTH

Flakes: width is measured at the widest point perpendicular to the bulbar axis

Other: width is taken as the maximum measurement along an axis perpendicular to the axis of length

ATTRIBUTE IV: THICKNESS

Flakes: thickness is taken at the thickest point on the object, excluding the bulb of percussion and the striking platform

Other: thickness is taken as the measurement perpendicular to the width measurement along an axis perpendicular to the axis of length

* Only those raw materials recorded from 45-OK-2 and 45-OK-2A are listed here; a complete list is available in the Project's Research Design (Campbell 1984d).

Table B-2. Functional dimensions.

DIMENSION I: UTILIZATION/MODIFICATION

None
Wear only
Manufacture only
Manufacture and wear
Modified/indeterminate
Indeterminate

DIMENSION II: TYPE OF MANUFACTURE

None
Chipping
Pecking
Grinding
Chipping and pecking
Chipping and grinding
Pecking and grinding
Chipping, pecking, grinding
Indeterminate/not applicable

DIMENSION III: MANUFACTURE DISPOSITION

None
Partial
Total
Indeterminate/not applicable

DIMENSION IV: WEAR CONDITION

None
Complete
Fragment

DIMENSION V: WEAR/MANUFACTURE RELATIONSHIP

None
Independent
Overlapping - total
Overlapping - partial
Independent - opposite
Indeterminate/not applicable

DIMENSION VI: KIND OF WEAR

Abrasion/grinding
Smoothing
Crushing/pecking
Polishing

DIMENSION VI: Continued

Feathered chipping
Feathered chipping/abrasion
Feathered chipping/smoothing
Feathered chipping/crushing
Feathered chipping/polishing
Hinged chipping
Hinged chipping/abrasion
Hinged chipping/smoothing
Hinged chipping/crushing
Hinged chipping/polishing
None

DIMENSION VII: LOCATION OF WEAR

Edge only
Unifacial edge
Bifacial edge
Point only
Point and unifacial edge
Point and bifacial edge
Point and any combination
Surface
Terminal surface
None

DIMENSION VIII: SHAPE OF WORN AREA

Not applicable
Convex
Concave
Straight
Point
Notch
Slightly convex
Slightly concave
Irregular

DIMENSION IX: ORIENTATION OF WEAR

Not applicable
Parallel
Oblique
Perpendicular
Diffuse
Indeterminate

DIMENSION X: OBJECT EDGE ANGLE

Actual edge angle

Table B-3. Projectile point classification.

DIMENSION I: BLADE-STEM JUNCTURE

N. Not separate
1. Side-notched
2. Shouldered
3. Squared
4. Barbed
9. Indeterminate

DIMENSION II: OUTLINE

N. Not applicable
1. Triangular
2. Lanceolate
9. Indeterminate

DIMENSION III: STEM EDGE ORIENTATION

N. Not applicable
1. Straight
2. Contracting
3. Expanding
9. Indeterminate

DIMENSION IV: SIZE

N. Not applicable
1. Large
2. Small

DIMENSION V: BASAL EDGE SHAPE

N. Not applicable
1. Straight
2. Convex
3. Concave
4. Point
5. 1 or 2 and notched
9. Indeterminate

DIMENSION VI: BLADE EDGE SHAPE

N. Not applicable
1. Straight
2. Excurvate
3. Incurvate
4. Reworked
9. Indeterminate

DIMENSION VII: CROSS SECTION

N. Not applicable
1. Planoconvex
2. Biconvex
3. Diamond
4. Trapezoidal
9. Indeterminate

DIMENSION VIII: SERRATION

N. Not applicable
1. Not serrated
2. Serrated
9. Indeterminate

DIMENSION IX: EDGE GRINDING

N. Not applicable
1. Not ground
2. Blade edge
3. Stem edge
9. Indeterminate

DIMENSION X: BASAL EDGE THINNING

N. Not applicable
1. Not thinned
2. Short flake scars
3. Long flake scars
9. Indeterminate

DIMENSION XI: FLAKE SCAR PATTERN

N. Not applicable
1. Variable
2. Uniform
3. Mixed
4. Collateral
5. Transverse
6. Other
9. Indeterminate

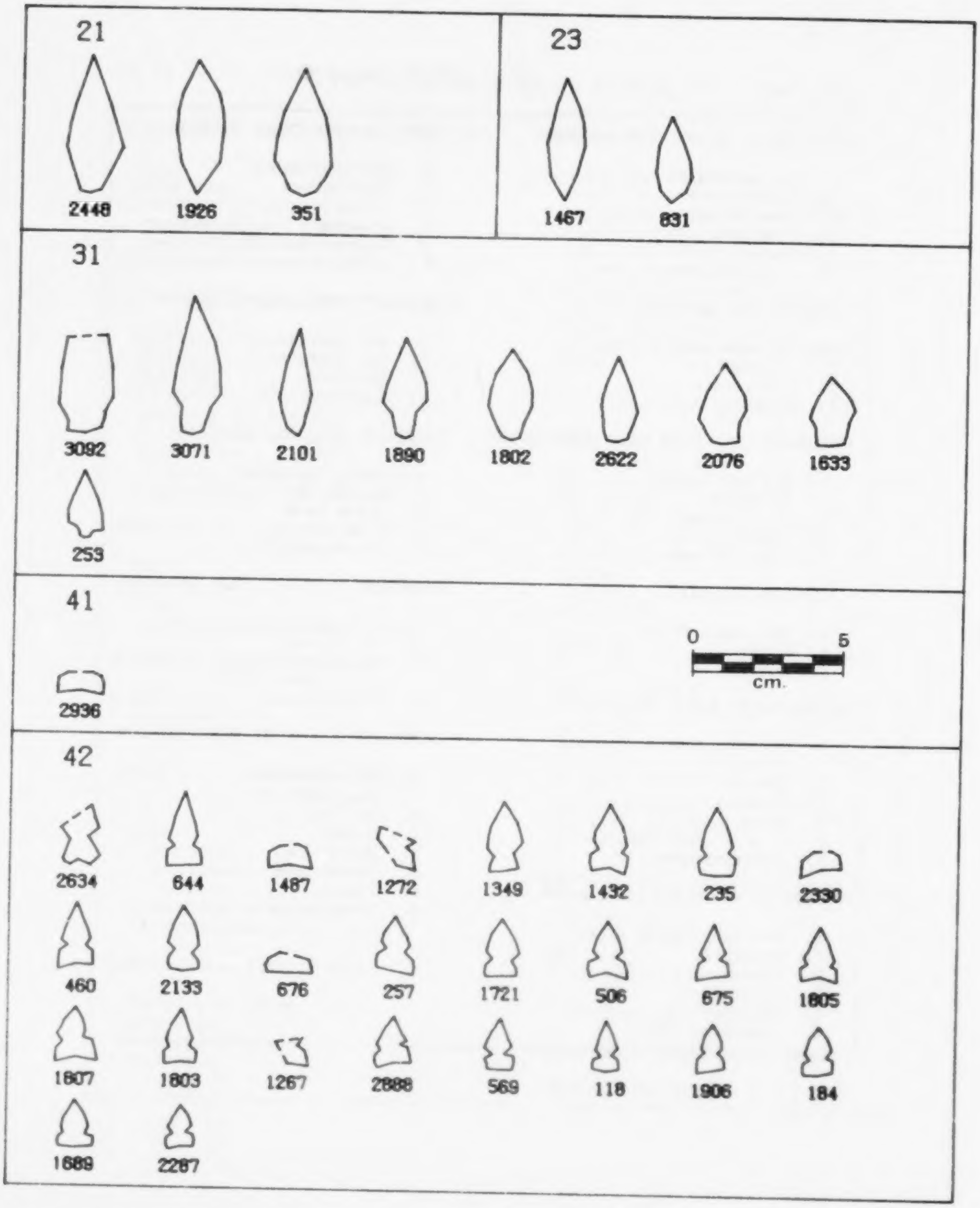
21
2448
1926
351
23
1467
831
31
3092
3071
2101
1890
1802
2622
2076
1633
253
41
2936
0
5
cm.
42
2634
644
1487
1272
1349
1432
235
2330
460
2133
676
257
1721
506
675
1805
1807
1803
1267
2888
569
118
1906
184
1689
2287

Figure B-1. Projectile point outlines from digitized measurements, 45-OK-2. Upper number is historic type (see Figure 3-12 for key). Lower number is master number.

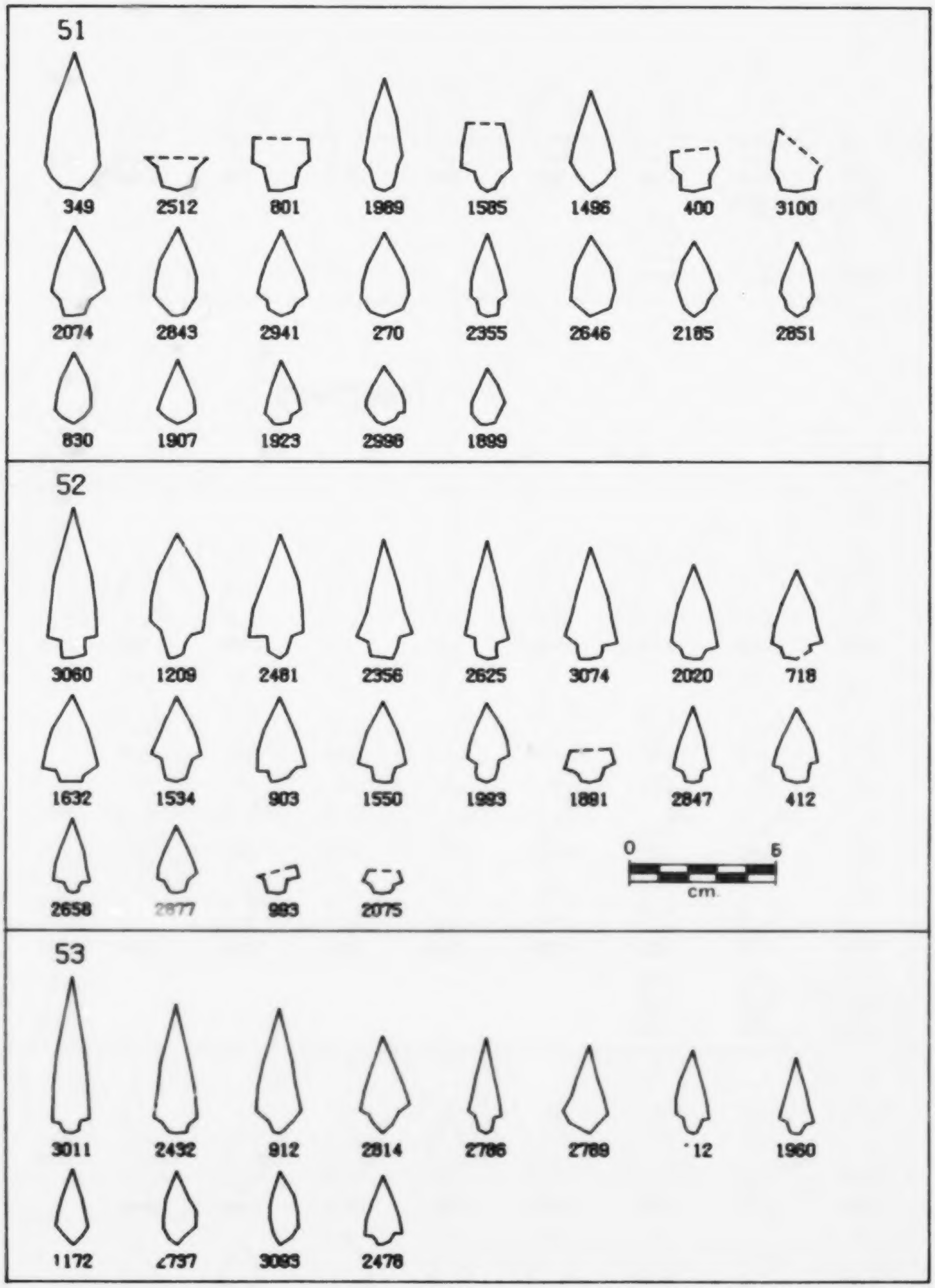
51
349
2512
801
1989
1585
1496
400
3100
2074
2843
2941
270
2355
2646
2185
2851
830
1907
1923
2998
1899
52
3060
1209
2481
2356
2625
3074
2020
718
1632
1534
903
1550
1993
1881
2847
412
2658
2877
983
2075
0
5
cm.
53
3011
2432
912
2814
2786
2789
'12
1960
1172
2737
3093
2478

Figure B-1. Cont'd.

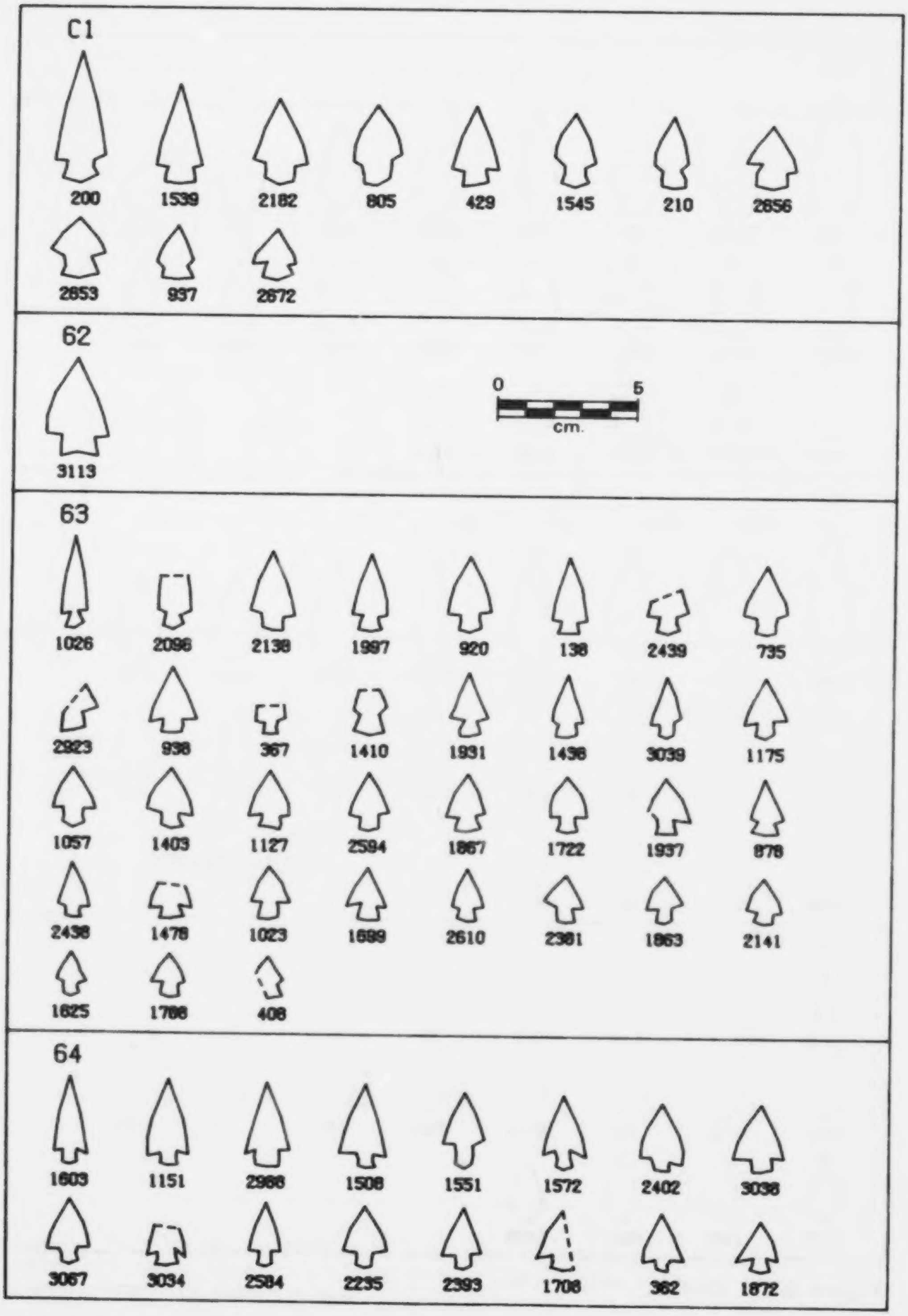
C1
200
1539
2182
805
429
1545
210
2856
2853
937
2872
62
3113
0
5
cm.
63
1026
2096
2138
1997
920
138
2439
735
2923
938
367
1410
1931
1436
3039
1175
1057
1403
1127
2594
1867
1722
1937
878
2438
1478
1023
1689
2610
2381
1863
2141
1625
1786
408
64
1603
1151
2988
1508
1551
1572
2402
3038
3067
3034
2584
2235
2393
1708
362
1872

Figure B-1. Cont'd.

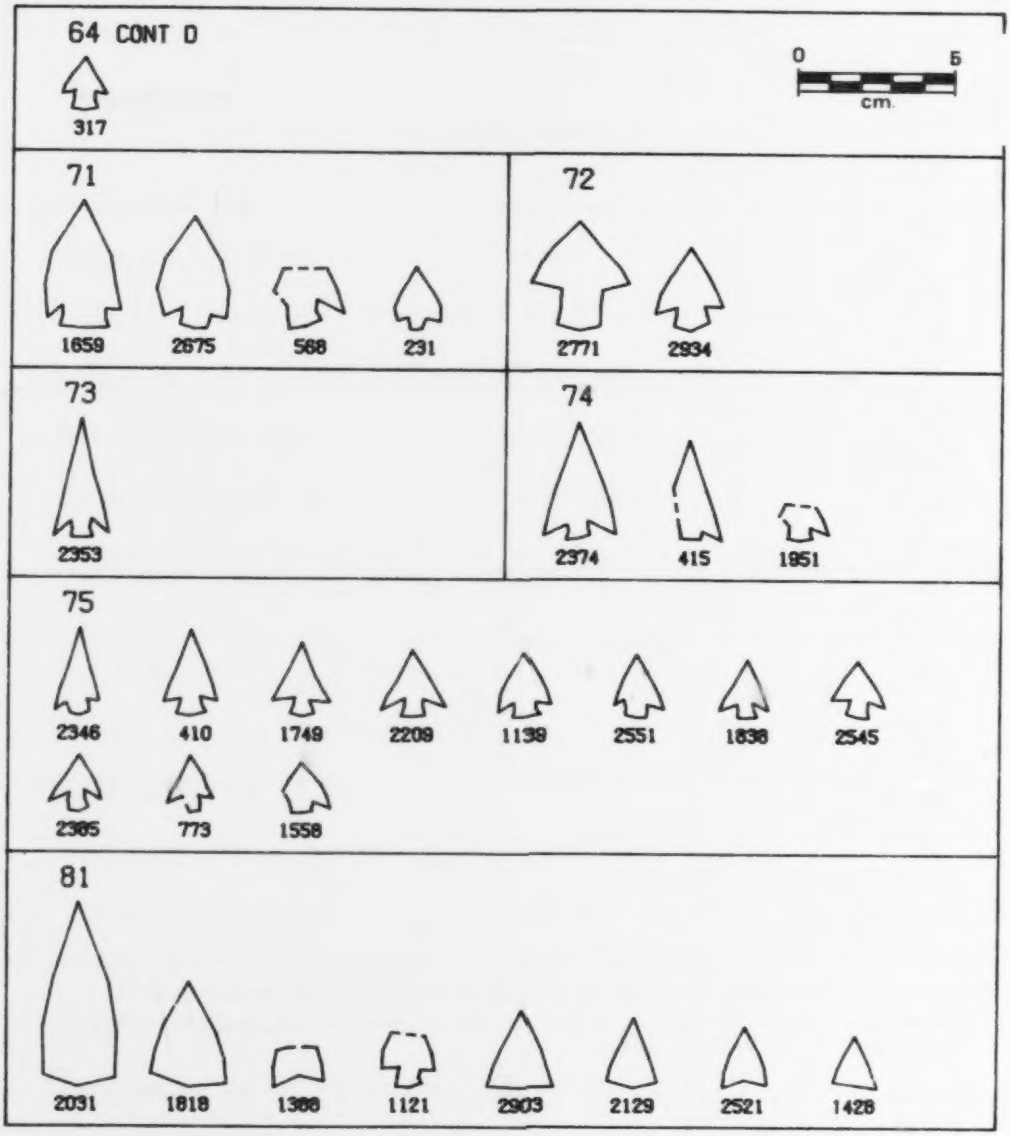
64 CONT D
317
0
5
cm.
71
1659
2675
568
231
72
2771
2934
73
2353
74
2374
415
1851
75
2346
410
1749
2209
1139
2551
1838
2545
2385
773
1558
81
2031
1818
1388
1121
2903
2129
2521
1428

Figure B-1. Cont'd.

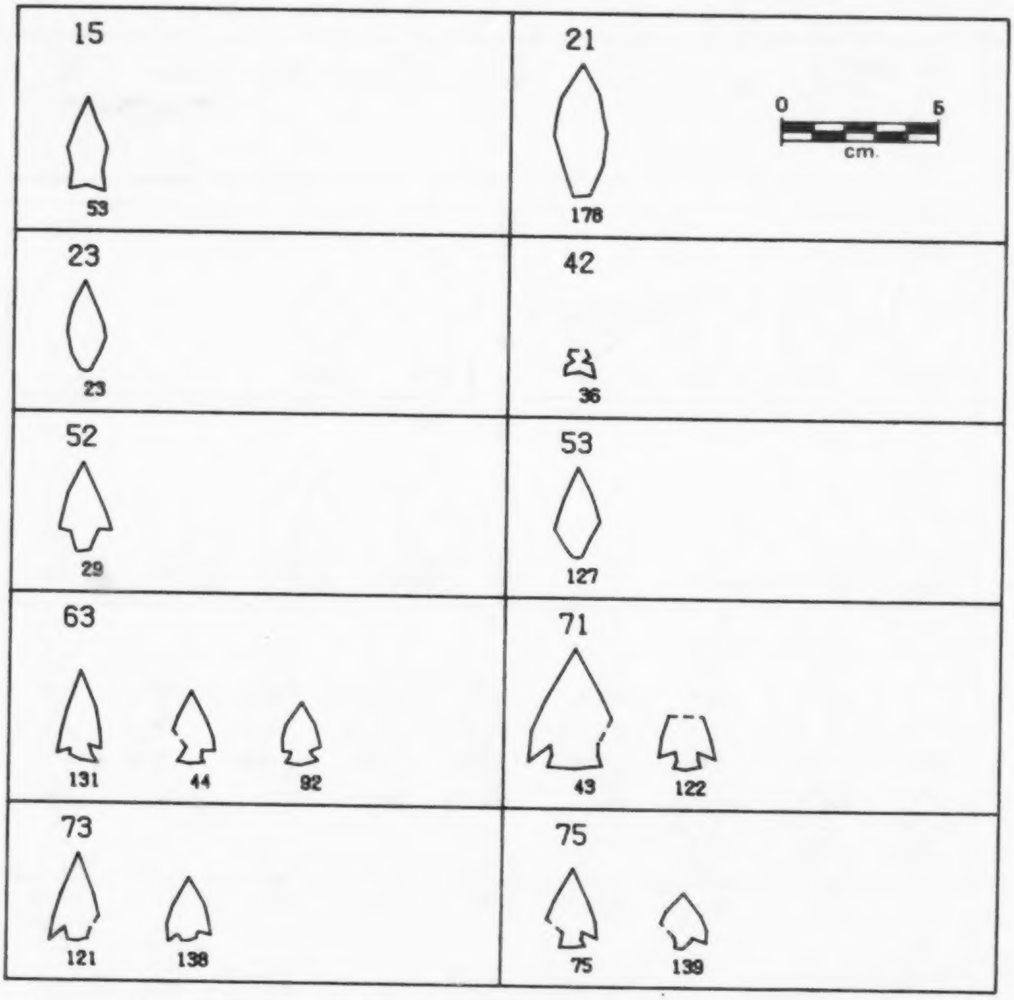
15
53
21
178
0
5
cm.
23
23
42
36
52
29
53
127
63
131
44
92
71
43
122
73
121
138
75
75
139

Figure B-2. Projectile point outlines from digitized measurements, 45-OK-2A. Upper number is historic type (see Figure 3-12 for key). Lower number is master number.

APPENDIX C:
FAUNAL ASSEMBLAGE

45-OK-2

CLASS MAMMALIA

Family Leporidae

Lepus cf. *townsendii* (White-tailed hare)

Zone 3: 1 metapodial fragment, 1 first phalanx fragment.

Zone 4: 2 metapodial fragments, 2 phalanx fragments.

Family Sciuridae (squirrels and their allies)

Marmota flaviventris (yellow-bellied marmot)

Zone 1: 4 mandible fragments, 1 incisor, 3 lower molars, 1 molar fragment, 1 radius fragment, 2 femur fragments, 1 metapodial.

Zone 2: 6 skull fragments, 2 incisor fragments, 1 lower molar, 1 humerus fragment, 2 tibia fragments.

Zone 4: 1 mandible fragment with M_3.

Family Castoridae

Castor canadensis (beaver)

Zone 2: 3 incisor fragments, 1 humerus fragment.

Zone 3: 1 incisor fragment, 1 molar.

Family Heteromyidae

Perognathus parvus (Great Basin pocket mouse)

Zone 1: 1 mandible, 1 mandible fragment, 1 maxilla fragment, 1 innominate, 1 tibia fragment.

Zone 2: 3 skull fragments, 7 maxilla fragments, 8 mandibles, 3 mandible fragments, 1 humerus, 1 humerus fragment, 5 innominates, 4 femurs, 2 femur fragments, 1 tibia.

Zone 3: 1 skull, 2 skull fragments, 1 maxilla, 3 maxilla fragments, 7 mandibles, 6 mandible fragments, 3 scapulae, 1 scapula fragment, 3 humeri, 2 humerus fragments, 2 ulnas, 2 radii, 2 innominates, 5 femurs, 2 femur fragments, 7 tibias, 1 tibia fragment.

Zone 4: 4 maxilla fragments, 4 mandibles, 3 mandible fragments, 4 innominates, 1 innominate fragment, 2 femurs, 1 tibia, 1 tibia fragment.

Family Geomyidae

Thomomys talpoides (Northern pocket gopher)

Zone 1: 2 humerus fragments, 1 innominate fragment, 2 tibia fragments.

Zone 2: 1 skull, 8 skull fragments, 3 mandibles, 8 mandible fragments, 1 atlas vertebra, 2 axis vertebrae, 2 lumbar vertebrae, 1 scapula, 7 humeri, 7 humerus fragments, 1 ulna fragment, 2 innominates, 2 innominate fragments, 3 femurs, 6 femur fragments, 1 tibia, 3 tibia fragments.

Zone 3: 11 skull fragments, 8 mandibles, 18 mandible fragments, 1 incisor, 2 atlas vertebrae, 1 axis vertebra, 3 lumbar vertebrae, 4 scapulas, 10 humeri, 7 humerus fragments, 1 radius, 1 ulna, 2 ulna fragments, 8 innominates, 2 femurs, 5 femur fragments, 4 tibias, 1 tibia fragment.

Zone 4: 1 skull, 13 skull fragments, 9 mandibles, 25 mandible fragments, 3 atlas vertebrae, 4 axis vertebrae, 2 thoracic vertebrae, 8 lumbar vertebrae, 5 scapulas, 3 scapula fragments, 11 humeri, 6 humerus fragments, 1 ulna, 1 ulna fragment, 2 radii, 2 innominates, 4 innominate fragments, 8 femurs, 6 femur fragments, 5 tibias, 1 tibia fragment.

Family Cricetidae

Zone 2: 2 femurs.

Zone 3: 1 maxilla fragment, 1 mandible, 4 mandible fragments, 1 thoracic vertebra fragment, 2 lumbar vertebra fragments, 1 innominate, 2 innominate fragments, 1 femur, 1 femur fragment.

Zone 4: 2 mandible fragments.

Ondatra zibethicus (muskrat)

Zone 3: 1 tibia fragment.

Neotoma cinerea (bushy-tailed wood rat)

Zone 2: 1 mandible fragment with M_1.

Lagurus curtatus (Sagebrush vole)

Zone 1: 1 mandible fragment.

Zone 2: 1 mandible, 2 mandible fragments.

Zone 3: 1 skull fragment, 1 M^1.

Microtus spp. (Meadow mice)

Zone 2: 1 skull fragment, 3 mandibles, 1 mandible fragment.

Zone 3: 1 skull fragment, 2 mandibles

Zone 4: 1 skull fragment, 2 mandibles, 1 mandible fragment.

Peromyscus maniculatus (deer mouse)

Zone 1: 1 mandible fragment.

Zone 2: 1 mandible, 1 mandible fragment.

Zone 3: 5 mandibles, 1 mandible fragment, 1 innominate, 1 femur.

Zone 4: 1 mandible, 1 mandible fragment, 1 humerus.

Family Canidae

Zone 1: 1 innominate fragment, 1 first phalanx, 1 second phalanx.

Zone 2: 1 mandible fragment.

Zone 3: 1 mandible fragment, 1 cervical vertebra fragment, 1 radius fragment, 1 fibula fragment, 1 calcaneus fragment.

Zone 4: 1 canine.

Canis sp. (coyote, wolf, dog)

Zone 2: 1 scapula fragment, 1 first phalanx fragment, 1 second phalanx, 1 third phalanx, 1 lumbar vertebra fragment.

Zone 3: 1 second phalanx

Zone 4: 1 calcaneus fragment.

Family Ursidae

Ursus americanus (black bear)

Zone 3: 1 metatarsal.

Family Mustelidae

Lutra canadensis (river otter)

Zone 1: 1 mandible with P_{234}, M_{12}.

Family Felidae

Lynx sp.

Zone 2: 1 second phalanx fragment.

Zone 4: 1 second phalanx.

Family Antilocapridae

Antilocapra americana (pronghorn antelope)

Zone 1: 1 P_3, 1 molar fragment, 1 second phalanx fragment.

Zone 2: 1 humerus fragment, 7 metapodial fragments, 1 first phalanx fragment, 1 second phalanx.

Zone 3: 1 molar fragment, 1 innominate fragment.

Zone 4: 1 astragulus.

Family Bovidae

Sheep/antelope

Zone 1: 35 molar fragments.

Zone 2: 1 incisor fragment, 83 molar fragments.

Zone 3: 1 incisor fragment, 18 molar fragments.

Zone 4: 1 incisor fragment, 21 molar fragments.

Ovis canadensis (bighorn sheep)

Zone 1: 1 molar fragment, 1 scapula fragment.

Zone 2: 2 maxilla fragments, 1 P_3, 1 P_4, 6 molar fragments, 1 scapula fragment, 1 metapodial fragment, 2 astragali, 1 calcaneus fragment, 1 second phalanx, 1 third phalanx, 1 third phalanx fragment.

Zone 4: 1 maxilla fragment with $P^{2,3,4}$, 1 mandible fragment with $P_{2,3,4}$, 1 mandible fragment with $P_{2,3}$, 1 mandible fragment with M_3, 1 maxilla fragment with indeterminate molar, 3 upper molars, 11 molar fragments, 1 calcaneus fragment, 1 first phalanx fragment.

Family Cervidae

Zone 2: 1 antler fragment

Zone 3: 1 antler fragment

Cervus elaphus (elk)

Zone 1: 1 deciduous lower premolar.

Zone 2: 3 molar fragments.

Zone 3: 1 molar fragment, 1 tibia fragment.

Zone 4: 1 molar fragment.

Odocoileus spp. (deer)

Zone 1: 7 antler fragments, 1 mandible fragment with M_{23}, 1 mandible fragment with M_1 and M_2 fragment, 3 mandible fragments, 1 symphysis with 4 incisors, 11 incisors, 1dP_2, 1dP_3, 1dP_4, 2P_2 fragments, 1 M^1, 491 molar fragments, 1 atlas vertebra fragment, 2 scapula fragments, 1 humerus fragment, 1 ulna fragment, 1 articulated unciform - trapezoid magnum - metacarpal fragment, 1 metacarpal fragment, 2 innominate fragments, 1 femur fragment, 2 tibia fragments, 1 astragalus, 1 calcaneus fragment, 2 dewclaw fragments, 5 metapodial fragments, 1 naviculocuboid, 1 first phalanx, 9 first phalanx fragments, 1 second phalanx, 7 second phalanx fragments, 1 third phalanx, 3 third phalanx fragments.

Zone 2: 48 antler fragments, 7 skull fragments, 1 maxilla fragment with P^{234}, 1 maxilla fragment with P^4M^1, 1 upper molar, 3 upper molar fragments, 3 upper premolars, 2 upper premolar fragments, 2 mandible fragments with P_{23}, 1 mandible fragment with P_4M_1, 1 mandible fragment with M_{23}, 5 mandible fragments, 8 incisors, 6 incisor fragments, 3P_3, 1P_4, 1P_4 fragment, 1M_1, 492 molar fragments, 2dP_2, 1dP_2 fragment, 1dP_3, 1dP_4 fragment, 2 scapulas, 1 scapula fragment, 1 radius fragments, 3 ulna fragments, 2 innominate fragments, 2 femur fragments, 3 astragali, 1 metacarpal fragment, 2 metapodial fragments, 5 dewclaw fragments, 3 first phalanx fragments, 1 second phalanx, 2 third phalanges.

Zone 3: 4 antler fragments, 1 maxilla fragment with M12, 1 maxilla fragment with 1 molar, 7 upper molars, 1 mandible fragment with P_{234}, 1 mandible fragment with P_{23}, 1dP_2, 1dP_3, 1dP, 1P_3, 1P_3 fragment, 1M_2, 1M_3, 1M_3 fragment, 1 lower molar, 6 incisors, 2 incisor fragments, 283 molar fragments, 1 radius fragment, 1 ulna fragment, 4 astragali, 1 astragalus fragment, 1 calcaneus fragment, 1 naviculocuboid fragment, 7 metapodial fragments, 2 first phalanx fragments, 1 dewclaw fragment.

Zone 4: 1 antler fragment, 2 maxilla fragments with P234M1, 1 maxilla fragment with P34M12, 1 maxilla fragment with P2, 1 maxilla fragment with P^4M^1, 1 maxilla fragment with M^{23}, 2 deciduous upper premolars, 6 upper premolars, 5 upper molars, 1 mandible fragment with dP_4, 1 mandible fragment with d$P_{234}M_1$, 4 mandible fragments with P_{23}, 1 mandible fragment with P_4, 1 mandible fragment with $P_{234}M_{12}$, 3 mandible fragments with $P_{234}M_1$, 2 mandible fragments with P_4M_{123}, 5 mandible fragments with M_{123}, 4 mandible fragments with M_{23}, 1 mandible fragment with M_2, 2 mandible fragments with M_3, 1dP_2, 2dP_3, 2dP_4, 1P_2 2P_2 fragments, 1P_3, 1P_3 fragment, 1M_3, 3M_3 fragments, 3 lower molars, 17 incisors, 4 incisor fragments, 278 molar fragments, 4 mandible fragments, 4 scapula fragments, 1 humerus fragment, 1 radius fragment, 1 ulna fragment, 1 metacarpal fragment, 1 metatarsal fragment, 7 metapodial fragments, 2 dewclaw fragments, 3 astragali, 1 calcaneus fragment, 1 naviculocuboid, 3 first phalanx fragments, 2 third phalanges.

Family Equidae

Equus caballus (horse)

Zone 1: 2 molar fragments, 2 first phalanges, 2 second phalanges, 2 third phalanges.

Deer Size (deer, pronghorn, sheep)

Zone 1: 10 skull fragments, 3 petrosals, 12 petrosal fragments, 5 mandible fragments, 1 axis vertebra fragment, 4 cervical vertebra fragments, 6 thoracic vertebrà fragments, 12 lumbar vertebra fragments, 11 vertebra centrum fragments, 38 rib fragments, 1 sternabra fragment, 3 costal cartilage fragments, 6 scapula fragments, 11 humerus fragments, 9 radius fragments, 6 ulna fragments, 2 unciforms, 1 unciform fragment, 1 trapezoid magnum, 1 trapezoid magnum fragment, 2 scaphoids, 2 scaphoid fragments, 7 metacarpal fragments, 6 innominate fragments, 9 femur fragments, 15 tibia fragments, 1 fibula, 2 fibula fragments, 18 astragalus fragments, 6 calcaneus fragments, 2 naviculocuboid fragments, 1 tarsal, 13 sesamoids, 23 metatarsal fragments, 44 metapodial fragments, 10 dewclaw fragments, 15 first phalanx fragments, 5 second phalanx fragments, 14 phalanx fragments.

Zone 2: 16 skull fragments, 11 petrosal fragments, 27 mandible fragments, 2 hyoid fragments, 5 atlas fragments, 7 axis fragments, 13 cervical vertebra fragments, 8 thoracic vertebra fragments, 22 lumbar vertebra fragments, 2 caudal vertebra, 2 caudal vertebrae fragments, 1 sacrum fragment, 25 vertebra centrum fragments, 104 rib fragments, 11 costal cartilage fragments, 13 scapula fragments, 16 humerus fragments, 18 radius fragments, 5 ulna fragments, 2 unciforms, 1 scaphoid fragment, 2 trapezoid magnums, 1 lunate, 2 lunate fragments, 2 cuneiforms, 11 metacarpal fragments, 4 innominate fragments, 13 femur fragments, 29 tibia fragments, 1 patella, 2 fibula fragments, 9 astragulus fragments, 4 calcaneus fragments, 2 naviculocuboid fragments, 2 tarsals, 21 sesamoids, 41 metatarsal fragments, 68 metapodial fragments, 8 dewclaw fragments, 20 first phalanx fragments, 5 second phalanx fragments, 1 third phalanx fragment, 13 phalanx fragments.

Zone 3: 10 skull fragments, 9 mandible fragments, 2 hyoid fragments, 7 petrosal fragments, 1 incisor fragment, 4 cervical vertebrae fragments, 1 thoracic vertebra fragment, 10 lumbar vertebra fragments, 6 vertebra centrum fragments, 64 rib fragments, 1 costal cartilage fragment, 7 scapula fragments, 15 humerus fragments, 9 radius fragments, 4 ulna fragments, 1 unciform, 1 trapezoid magnum, 2 lunate fragments, 1 cuneiform, 1 cuneiform fragment, 22 metacarpal fragments, 2 innominate fragments, 15 femur fragments, 1 patella, 18 tibia fragments, 1 fibula fragment, 4 astragalus fragments, 1 calcaneus fragment, 2 naviculocuboid fragments, 1 tarsal, 1 tarsal fragment,2 sesamoids, 43 metatarsal fragments, 64 metapodial fragments, 7 dewclaw fragments, 11 first phalanx fragments, 6 second phalanx fragments, 8 phalanx fragments.

Zone 4: 5 skull fragments, 17 mandible fragments, 10 petrosal fragments, 4 axis vertebra fragments, 1 cervical vertebra fragment, 2 thoracic vertebra fragments, 6 lumbar vertebra fragments, 4 vertebra centrum fragments, 46 rib fragments, 6 costal cartilage fragments, 16 scapula fragments, 11 humerus fragments, 18 radius fragments, 12 ulna fragments, 1 cuneiform, 10 metacarpal fragments, 2 innominate fragments, 16 femur fragments, 17 tibia fragments, 3 astragalus fragments, 2 calcaneus fragments, 1 naviculocuboid fragment, 3 tarsals, 8 sesamoids, 32 metatarsal fragments, 75 metatapodial fragments, 3 dewclaw fragments, 3 first phalanx fragments, 4 second phalanx fragments, 11 phalanx fragments.

Elk Size (elk, cow, bison)

Zone 1: 1 axis fragment, 1 humerus fragment, 1 radius fragment, 1 tarsal.

Zone 2: 1 ulna fragment, 1 fibula fragment, 1 metapodial fragment.

Zone 3: 1 humerus fragment, 3 tibia fragments, 1 fibula fragment, 1 calcaneus fragment, 3 metapodial fragments, 2 phalanx fragments.

Zone 4: 1 radius fragment, 2 phalanx fragments.

CLASS REPTILIA

Family Chelydridae

Chrysemys picta (Painted turtle)

Zone 1: 10 shell fragments.

Zone 2: 40 shell fragments.

Zone 3: 18 shell fragments.

Zone 4: 9 shell fragments.

Family Colubridae

Zone 1: 3 vertebrae.

Zone 2: 79 vertebrae.

Zone 3: 4 vertebrae.

Zone 4: 5 vertebrae.

CLASS AMPHIBIA

Family Ranidae/Bufonidae

Zone 2: 2 humerus fragments, 2 urostyle.

Zone 3: 1 humerus, 2 humerus fragments, 1 ulna, 1 ulna fragment, 1 femur fragment, 2 tibia fragments.

Zone 4: 1 humerus, 1 ulna, 1 tibia.

CLASS PISCES

Family Salmonidae

Zone 1: 3 vertebrae, 47 vertebra fragments.

Zone 2: 9 vertebrae, 67 vertebra fragments, 1 otolith.

Zone 3: 18 vertebrae, 76 vertebra fragments.

Zone 4: 28 vertebrae, 76 vertebra fragments, 1 otolith.

Family Cyprinidae

Zone 1: 9 vertebrae, 2 vertebra fragments.

Zone 2: 4 vertebrae, 3 vertebra fragments.

Zone 3: 1 vertebra fragment.

Zone 4: 3 vertebrae, 3 vertebra fragments.

Family Catostomidae

Zone 4: 6 vertebra fragments.

45-OK-2A

CLASS MAMMALIA

Family Leporidae

Lepus cf. townsendii (Whitle-tailed jackrabbit)

Zone 1: 1 tibia shaft.

Family Sciuridae (squirrels and their allies)

Marmota flaviventris (Yellow-bellied marmot)

Materials:

Zone 1: 1 humerus.

Zone 3: 1 femur fragment.

Zone 4: 1 upper molar.

Family Geomyidae

Thomomys talpoides (Northern pocket gopher)

Perognathus parvus (Great Basin pocket mouse)

Zone 1: 1 tibia fragment.

Zone 2: 1 skull fragment, 1 molar, 1 incisor, 1 mandible, 2 mandible fragments, 2 innominate fragments, 2 humeri, 6 femurs, 1 femur fragment, 2 tibia fragments.

Zone 3: 2 skull fragments, 1 mandible fragment, 1 humerus, 1 radius, 1 ulna fragment, 1 innominate fragment, 2 femurs, 3 femur fragments.

Zone 4: 1 skull, 2 mandibles, 2 scapulas, 2 humeri, 1 radius, 1 ulna, 1 pelvis, 3 femurs, 3 femur fragments, 3 tibias, 1 tibia fragment.

Family Heteromyidae

Perognathus parvus

Zone 1: 1 innominate.

Zone 2: 5 skull fragments, 1 mandible, 6 mandible fragments, 1 molar, 2 innominates, 1innominate fragment, 1 femur, 1 tibia.

Zone 3: 1 skull fragment, 1 mandible fragment, 1 innominate.

Zone 4: 1 innominate, 1 femur, 1 tibia.

Family Cricetidae

Zone 2: 2 mandible fragments.

Zone 3: 1 femur.

Lagurus curtatus (Sagebrush vole)

Zone 2: 2 mandible fragments.

Microtus sp. (Meadow mouse)

Zone 3: 1 mandible.

Peromyscus maniculatus (Deer mouse)

Zone 1: 1 mandible fragment.

Family Erethizontidae

Erethizon dorsatum (Porcupine)

Zone 1: 3 incisor fragments.

Family Bovidae

Antilocapra americana (Pronghorn antelope)

Zone 2: 4 molars, 1 metatarsal fragment.

Ovis canadensis (Mountain sheep)

Zone 2: 185 horn core fragments (most likely all are individual), 1 skull fragment, 1 first phalanx fragment.

Odocoileus spp. (deer)

Zone 1: 1 skull fragment, 1 incisor fragment, 13 molar fragments, 1 carpal, 1 metapodial fragment, 1 second phalanx fragment, 1 third phalanx, 1 third phalanx fragment.

Zone 2: 1 P^4M^{123}, 1 dent $P_{234}M_1$, 1 mandible fragment, 4 incisors, 4 molars, 13 molar fragments, 1 humerus fragment, 1 radius fragment, 3 ulna fragments, 1 tibia fragment, 1 tarsal, 3 metatarsal fragments, 8 first phalanx fragments, 4 second phalanges, 5 second phalanx fragments, 5 third phalanges.

Zone 3: 3 molar fragments, 1 second phalanx fragment.

Deer Size

Zone 1: 1 skull fragment, 1 mandible fragment, 2 cervical vertebrae fragments, 2 rib fragments, 3 humerus fragments, 1 ulna fragment, 2 carpal fragments, 1 metacarpal fragment, 1 innominate fragment, 2 femur fragments, 2 tibia fragments, 1 tarsal 5 metatarsal fragments, 1 dewclaw fragment, 9 metapodial fragments, 1 phalanx fragment.

Zone 2: 8 skull fragments, 4 mandible fragments, 1 axis fragments, 6 cervical vertebrae fragments, 1 thoracic vertebrae fragment, 4 lumbar vertebrae fragments, 5 centrum fragments, 29 rib fragments, 12 fragments costal cartilage, 4 scapula fragments, 5 humerus fragments, 6 radius fragments, 5 ulna fragments, 1 carpal, 4 metacarpal fragments, 6 femur fragments, 7 tibia fragments, 1 calcaneus fragment, 1 tarsal fragment, 7 metatarsal fragments, 3 first phalanx fragments, 1 second phalanx fragment, 1 third phalanx, 5 metapodial fragments, 4 phalanx fragments, 1 patella, 5 sesamoids.

Zone 3: 1 cervical vertebra fragment, 8 rib fragments, 1 radius fragment, 1 ulna fragment, 1 femur fragment, 2 first phalanx fragments, 3 metapodial fragments.

Zone 4: 1 first phalanx fragment, 1 metapodial fragment.

Sheep/antelope

Zone 1: 1 molar fragment.

CLASS REPTILIA

Family Chelydridae

Chrysemys picta (Western painted turtle)

Zone 2: 11 shell fragments.

Zone 3: 4 shell fragments.

Family Colubridae

Zone 2: 1 vertebra.

Zone 3: 20 vertebrae.

Zone 4: 6 vertebrae.

Family Boidae

Zone 3: 1 vertebra.

CLASS AMPHIBIA

Family Ranidae/Bufonidae (frogs/toads)

Zone 3: 1 innominate fragment, 1 tibia fragment.

CLASS PISCES

Family Salmonidae

Zone 1: 3 vertebra, 1 otolith.

Zone 2: 26 vertebrae, 106 vertebra fragments, 1 otolith.

Zone 3: 7 vertebrae, 69 vertebra fragments, 3 otoliths.

Zone 4: 9 vertebra fragments.

Family Catastomidae

Zone 1: 1 vertebra.

Zone 2: 2 vertebrae.

Zone 3: 1 vertebra.

APPENDIX D:

DESCRIPTION OF CONTENTS OF UNCIRCULATED APPENDICES

Detailed data from two different analyses are available in the form of hard copies of computer files with accompanying coding keys.

Functional analysis data include provenience (site, analytic zone, excavation unit and level, and feature number and level (if applicable); object master number; abbreviated functional object type; and coding that describes each tool on a given object. Data normally are displayed in alphanumeric order by site, analytic zone, functional object type, and master number. Different formats nay be available upon request depending upon research focus.

Faunal analysis data include provenience (site, analytic zone, excavation unit and level, feature number, and level (if applicable); taxonomy (family, genus, species); skeletal element; portion; side; sex; burning/butchering code; quantity; and age. Data normally are displayed in alphanumeric order by site, analytic zone, provenience, taxonomy, etc.

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